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ABSTRACT

The purpose of this manual is to help individuals and groups design and implement conservation education programs that will effectively bring about improved environmental management. The chapters describe: (1) how to gather environmental and social data for designing appropriate education programs; (2) how to judge the strengths and weaknesses of various conservation education methods, ranging from mass media to nature centers; and (3) how to implement and evaluate educational efforts. Each chapter ends with a series of questions that the reader can use to ensure that no important variables have been overlooked. The manual is intended to be useful to a wide range of people. While chapters two and three are aimed especially at the generalist, the entire manual is intended to be useful to those interested in designing appropriate education programs. (TW)

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Peace Corps

CONSERVATION EDUCATION:

A PLANNING GUIDE

By

David S. Wood
and
Diane Walton Wood

Illustrated by Heather H. Bentz

Peace Corps
Information Collection and Exchange
Manual M-23
October, 1985

CONSERVATION EDUCATION: A PLANNING GUIDE

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About the Authors

David and Diane Wood have designed and implemented a variety of conservation education programs and curricula in the United States, Canada, Latin America, Africa and the Caribbean. They have masters' degrees in science and environmental education from Cornell University and were conservation education volunteers for the Peace Corps in Paraguay from 1977-1981.

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We also acknowledge the useful suggestions, critiques, materials and support we received from many colleagues and friends: Lou Ann Dietz; Random DuBois; Filipinas Faina; Jacob Fillion; Marge Freese; Patrick Gregerson; Thomas Leverman; Edward McCrea; Richard Rowell, Helen Vukasin and Bill Weber. We are also most appreciative of Donna Frelick's editorial comments and extreme patience.

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And finally, we thank our friends and families who have endured "the book" far too long.

FOREWORD

I know of no more important and critical component of natural resources planning and management than conservation education. And I know of no one more suited to deal with this vital topic than Diane and David Wood.

Conservation education is the one component of resources management that is at the same time the most responsible for success or failure of a project and the most ignored. That seeming paradox is addressed by the Woods in the introduction to this practical and valuable book aimed at a wide range of readers.

The paradox should not be overlooked. For any natural resources management project to succeed it must have broad support and understanding. Requisite support does not come about simply because a development organization decides to fund a project, because a developing country requests a team of experts to prepare a management plan, or because legislation is passed to protect or conserve an area.

Broad support comes, simply, through understanding the need for sound conservation which leads to a real commitment. That process involves conservation education - for politicians, for project designers, for government officials affected by conservation, for funders, for resource managers, for the general public and people locally affected by conservation actions.

Not only is conservation education ignored, it is most often ignored by natural resources planners and managers who feel education is only an add-on luxury to be afforded by someone else. How wrong they are, as the myriad management documents collecting dust on shelves, and land use conflicts initiated by poorly planned development projects attest.

The Woods realize the importance of developing and designing a conservation education program by first listening, listening to the people who are affected by and who can best describe environmental problems. They know, and emphasize in this manual that listening is the key to effective communication which is the key to an effective conservation education program. They know this because they have a great deal of experience in developing countries at the ground-level designing and implementing successful programs.

I recall developing a Peace Corps assignment in Paraguay several years ago for one conservation education specialist for two years. Diane and David Wood were selected from among hundreds of qualified applicants to the Smithsonian-Peace Corps Environmental Program for the assignment. After initially saying "But we only wanted one person for two years," Paraguay asked the Woods to remain for four years and to design, implement, and train others for conservation education programs. They successfully did. Their experiences in Paraguay were only the beginning of what has led them now to being considered by many as two professionals who have the dedication, the confidence of associates in developing countries, and the sensitivity to listen, communicate, and then design effective conservation education programs.

I am pleased the Woods have shared these experiences with us in this manual. The Woods have a proven track record, and those readers who follow this manual will greatly enhance their chances for a successful program.

Dr. James A. Sherburne

Director of African Operations
African Wildlife Foundation

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INTRODUCTION

Wherever there are humans, there is "development". Wherever there is development, humans are interacting with the environment. People satisfy their basic needs by harvesting and using the earth's natural resources--water, air, plants, fish, wildlife, and soil. In the process, however, people can severely harm or destroy the environment that supplies these resources. Too often, human activity damages the environment's capacity to satisfy human demands; when this happens, the quality of people's lives inevitably suffers.

No nation is free of environmental problems. Poverty, overpopulation, poor planning, and an overemphasis on short-term economic gain without regard for its environmental consequences are only a few of the causes of environmental degradation. Fortunately, environmental problems are no longer considered inevitable. Throughout the world, national governments and private groups have begun to realize that improved management of their countries' natural resources means an improvement in the lives of their citizens.

International aid agencies have also been increasingly addressing environmental considerations. Their assistance has included designing environmentally sound development projects, encouraging appropriate technology alternatives, funding technical training opportunities, conducting environmental assessments, and supporting environmental research. In many cases, however, large donor agencies neglect one crucial area: the application of community education to environmental management. Frequently, education is an afterthought in environmental projects, the short sentence at the end of a series of recommendations, and a frill to be included only in the event of a surplus of project funds.

This is a critical omission, as it turns out, because community education is vital to the success of environmental management efforts. Rooms full of management plans and research results will do nothing unless they are taken off the shelves and implemented. For this to happen, all community members -- government leaders, farmers, the general public, school children, citizens' organizations, -- must be motivated to do their part in managing their environment wisely. The most reliable way to obtain people's cooperation in this endeavor is to demonstrate how it will benefit them. This, in short, is the role of conservation education.

Broadly defined, conservation education is any type of education that brings about improved natural resource management and reduces environmental damage. It can include a wide range of subjects, especially within science and natural resource management, and can be directed, formally and informally, at a variety of target audiences. Its objectives are to 1) help people become aware of and appreciate the value of natural resources and the ecological processes that maintain them, 2) help people know and understand what threatens the well-being of their environment, how the environment should be managed, and how they can contribute to its improved management, and 3) motivate people to do what they can to improve environmental management. The task of meeting all three of these objectives distinguishes conservation education from other types of education and instruction. Teaching people to appreciate their environment is not effective conservation education if their behavior does not change also. Likewise, motivating people to act in an environmentally responsible manner does no good if people take the wrong actions out of ignorance.

Conservation education in this manual is also distinguished from technical training, not by subject matter as much as by target audience and purpose. Technical training is a process of teaching present and future professionals the skills they need to do their jobs. Thus, teaching forestry to future forestry extension agents or soil management to future agronomists is technical training. Teaching schoolchildren the value of planting trees or farmers the value of soil conservation techniques is conservation education.

For conservation education to be effective, it must be tied closely to the environmental and social characteristics of the community itself. Each education program's objectives, information, communication methods, and audiences must be carefully identified if the program is to realize its ultimate goal -- improved environmental management. Arbitrarily designed efforts stand little chance of success.

The purpose of this manual is to help the reader design and implement conservation education programs that will effectively bring about improved environmental management. Chapters describe how to gather environmental and social data needed for designing appropriate education programs, how to judge the strengths and weaknesses of various conservation education methods, ranging from mass media to nature centers, and how to implement and evaluate educational efforts. The manual is designed to supplement the Peace Corps ICE manual "Teaching Conservation in Developing Countries," which presents practical information on implementing various types of conservation education projects. Each chapter ends with a series of questions which the reader can use to ensure that no important factors are overlooked. It is critical to select an education method and to implement a program only after running through the assessment procedure outlined in the manual. Otherwise, the risk is great that inappropriate methods will be used and that the potential of the conservation education efforts employing them will go unrealized.

The manual is intended to be useful to a wide range of people, whether they are working in small villages or large ministries in the capital city, and whether they are trained in a particular environmental specialty or "generalists" with broad backgrounds. Readers already trained as conservation educators or with a background in natural resource management may already be familiar with the environmental problems addressed in Chapters 2 and 3, which are included especially for "generalists"; however, they may find some of the information useful content for conservation education programs. Environmental specialists should find the process presented in the manual helpful in designing appropriate education programs.

Generalists, meanwhile, should not hesitate to consider a role in conservation education because of a lack of specific technical training. The resourceful generalist can often find sufficient technical assistance; it is most important to have an interest in working with people and a concern for their welfare.

1

Getting Oriented

INTRODUCTION

People will not initiate change unless they believe they will benefit from it. Thus, to change how people treat their environment, conservation education programs must first consider what people want and need from the environment. The conservation educator must begin with the environmental interests and concerns the people themselves express.

The conservation educator needs to know other things about the people he is working with, as well. To communicate information, he has to know how people communicate and how they best receive new information. To determine his audience, he has to know not only who is affecting the environment, but who affects those people affecting the environment, e.g. political leaders and respected community citizens. To be convincing, he has to establish trust, so he has to be familiar with local customs, beliefs, likes, and dislikes. His role has to be accepted by the community*.

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*Community in this manual refers to both the physical setting and the people with whom the conservation educator will be working. A community, then, can be a group of families, a small village, a region, or even an entire country.

In short, the conservation educator needs to become acquainted with the people he will be working with, and they need to become acquainted with him. The educator, therefore, needs to begin his task not with a preconceived solution and implementation plan, but with the intention to learn all he can about his community and to develop programs working closely with it that are appropriate to its needs. This cannot be done overnight; it requires sensitivity, curiosity, patience, a willingness to listen, and above all, a commitment to helping people help themselves.

This point is emphasized in practically all development literature, yet it is constantly overlooked. Often, development workers neglect to take into consideration the relevant social, political, and environmental factors that affect people's behavior. Consider, for example, the story of the project to provide a community in Senegal with a cash crop. Outside development workers chose cashew trees without asking the villagers which trees they preferred. They overlooked the village belief that cashews were inhabited by ghosts. The unfortunate consequence: a mysterious brush fire destroyed the cashew plantation (Hoskins 1979). This costly mistake could have been avoided if the development workers had made the effort to understand the people they were intending to help. Technical solutions should always be developed with as much input as possible from the people who will be implementing them.

Some development workers feel they do not have time to get to know their communities before getting started on a project. They feel a need to "produce" right away to prove they are successful and to establish credibility in the community. More often than not, this feeling is self-imposed, a pressure carried over from "western" cultures where tangible results equal success. In many developing countries such activities as socializing and making friends are an integral part of development work. It is the only way to learn those community customs, beliefs and values that ultimately influence project design. The time spent getting to know and understand people can be crucial in the development of successful projects. Programs conceived and implemented in haste usually result in failure.

Because guidelines for learning about communities are already well presented in other development manuals, this chapter will only sketch briefly some aspects of this process. For further information, the reader is urged to consult some of the sources listed in the bibliography.

GUIDELINES

Being An Outsider

Anyone who arrives in a community with the purpose of effecting change is bound to be regarded as an outsider. Indeed, even a country native can be considered an outsider in communities other than her own if she is bringing in new ideas or approaches. Some people may feel threatened by these new ideas and the outsiders that espouse them. The first job for the conservation educator, then, is to establish trust in the community.

Relying On A Counterpart

An outsider can benefit enormously from an "insider", a counterpart who can help the educator understand and work effectively within the community and, perhaps, carry on the educator's work after she is gone. A counterpart can often be most helpful by telling the educator honestly and reliably how she is perceived by the community and when she is misperceiving a situation.

The individual officially designated as a counterpart may not always satisfy all of these requirements, so a network of informal counterparts can also be helpful. These can be next-door neighbors, friends, fellow workers, or any individuals who are able to view their own culture somewhat objectively. With only one counterpart, the chances of information being misinterpreted are greater. A network of informal counterparts with a variety of viewpoints can help the educator gain a more comprehensive understanding of the community.

Assessing the Working Environment

Only by evaluating the working environment can the educator determine what she can do within it and how quickly she can begin. What is the pace of work in this environment? How does the organization to which she is assigned view her? Is it cautious or enthusiastic about her presence; does it welcome, resent, or not really care one way or the other about it? Does the organization have a firm idea of what it expects from her or does it hope she will define her own role? Does it expect her to come up with new ideas or simply to follow established agency procedures? Does her perception of her job differ from that of the organization?

Assessing the Social Environment

The conservation educator cannot expect to change people's behavior without an understanding of the social context in which they live. What are their economic, political, social, religious, and health concerns? Are there influential local religions, beliefs, superstitions, and taboos? How do people in this community react to change? Try to learn why other community programs have succeeded or failed. What led people to experiment and adopt new techniques?

It is also important to learn who makes and influences decisions in the community and who influences what community residents do. These people may be eventual targets for the conservation education program or they may prove to be effective counterparts. Which organizations and individuals have strong influence because of their wealth, position, social status, intelligence, technical ability, farming success, or political affiliation? Do community factions and frictions exist?

How do people receive new information and ideas in the community, both formally and informally? What are the communication roles of social clubs, churches, community squares and plazas, markets, extension agencies, and government offices? How are newspapers, radio, and television used? Are there organizations and individuals that have a strong influence on communication patterns because of their wealth, social status, tradition, etc.?

Finding Out About Predecessors

The first development worker in the community may encounter anything from wide open enthusiasm to cold skepticism. A conservation educator following in the footsteps of another worker from "outside", however, will almost certainly be viewed in light of the community's feelings about that worker. Comparisons will be inevitable. Tolerate them as much as possible, and, more importantly, try not to be territorial. It is a common tendency in development workers to want to see results from their own efforts. Nonetheless, the wheel need not be reinvented; it is costly to developing communities and breaks down the continuity that can bring about meaningful change. Try as much as possible to capitalize on what has already been done.

The most difficult situation is following development workers who have left behind a negative feeling. The educator's presence may be resented through no fault of his own, and he may have a difficult time being accepted by the community. This situation is frustrating as precious time may have to be spent creating receptivity for development workers in general. In the time available the educator may only be able to pave the way for someone else to follow with specific project ideas.

Keeping Accurate Records

It is critical to keep accurate and complete records that detail important social, political, and technical information so that development workers who follow can build effectively on what has already been learned and accomplished. It is a waste of time for successors to have to start over every two years or so.

SUMMARY

Each development worker must determine his own style for working with, and getting to know, people from a different culture. Whatever the approach, however, certain questions need to be answered in order to design effective conservation education programs:

- WHAT ARE PEOPLE"S MAIN INTERESTS AND CONCERNS?
- WHAT ARE SOME WIDESPREAD AND SIGNIFICANT BELIEFS, SUPERSTITIONS, AND TABOOS?
- WHAT ARE SOME IMPORTANT CUSTOMS THAT SEPARATE COMMUNITY RESIDENTS FROM "OUTSIDERS"?
- HOW DO PEOPLE REACT TO NEW IDEAS?
- HOW IS INFORMATION COMMUNICATED?
  - Informally
  - In the Workplace
- HOW ARE DECISIONS MADE?

  - Informally

  - In the Workplace

- WHO ARE THE COMMUNITY LEADERS?

  - Social

  - Political

- WHAT ARE PEOPLE'S ATTITUDES TOWARD YOU?

- HOW DOES YOUR HOST AGENCY VIEW YOUR ROLE?

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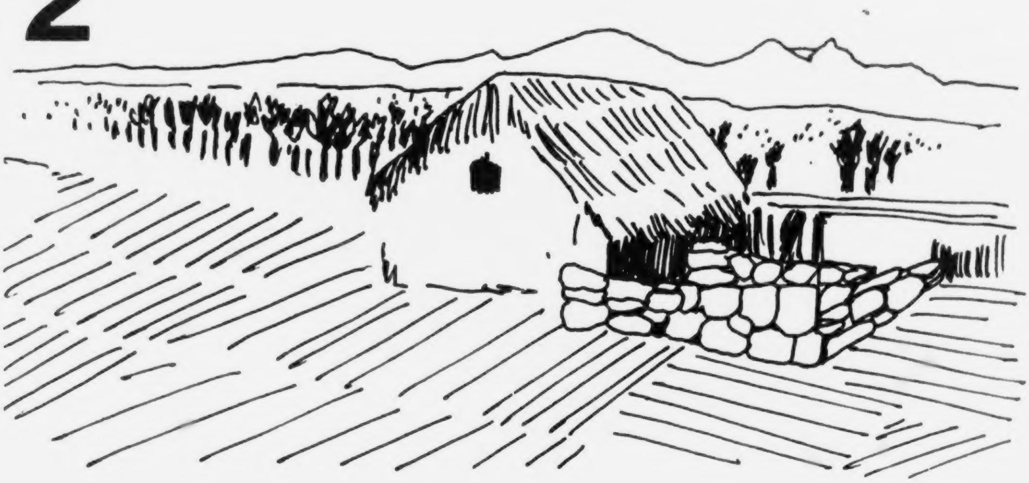


Assessing the Environmental Situation

INTRODUCTION

A conservation educator in a developing country can expect to find far more things to do than there is time for. There is no lack of environmental problems or educational strategies to deal with them. But with limited time and material resources, a conservation educator will not be able to address every possible environmental subject. Priorities will need to be set: Should people be taught how to plant trees or how to feed birds? Is the first order of business getting people to plow on the contour or to pick up community litter? Should people first know how to use an insecticide properly, or should they first learn basic ecological principles? At some point, certain issues will have to be chosen over others. The most effective way to approach the dilemma is to choose what to do based on sound criteria, not on personal preference.

There are any number of reasons to carry out a particular conservation education strategy--the host agency may request it, the educator may be experienced with it, or it may be easy to implement. The best reason to choose a specific approach, however, is because it has the best chance of improving environmental management. If the educator enjoys any flexibility in what can be done, then the approach that has the maximum positive environmental impact should be chosen.

Given this criterion, the first step in developing a conservation education program should be to identify the most pressing environmental problems that need addressing. A program that treats a relatively inconsequential problem will have less impact than if it focuses on an important one. This first step is a critical one, since it sets the direction of the education program. If the direction chosen is not the best one, it can be very difficult to change courses and start again.

Surprisingly, this stage is the one most neglected by conservation educators. It is easiest to implement education programs that teach general ecology or nature appreciation without discussing specific environmental problems. With some minor adjustments, the same program can be used worldwide with only a minimum of community-based information, and people may very well enjoy it. But the priority for many developing countries is not environmental attitudes, but environmental results. More than anything, they need solutions to grave environmental problems as soon as possible. Thus, conservation educators in developing situations have to remember that people's attitudes and awareness are the means to the end, not the end in itself. The final test of a conservation education effort is its environmental impact.

To be effective, conservation educators must first give serious consideration to assessing the environmental problems in their communities before beginning to teach. Not all actions altering the environment actually cause environmental problems. People need to harvest timber and wildlife, clear land for agriculture, divert waterways for irrigation, and establish factories which sometimes pollute air and water. Problems arise, however, when these activities reduce the environment's ability to provide for current and future generations' needs. The conservation educator has to determine which actions are actually causing environmental problems. To design appropriate programs the educator must understand the environmental problem--why it has occurred, its causes and effects, and what needs to be done to solve it. The following guidelines offer general suggestions on how to approach this challenge.

GUIDELINES

There are three basic ways to gather the information needed to evaluate the community environmental situation: 1) firsthand field observations, 2) interviews, and 3) a review of the literature. Involving counterparts and other people from the community in these activities increases the likelihood of making an accurate environmental assessment.

Observations

Begin by looking at how the local environment is being managed. Are people plowing up and down hills, cutting down forests, recklessly using pesticides, or trafficking in wildlife species in danger of becoming extinct? Always carry a notebook for recording impressions and noting the locations where the environment is being mismanaged. Observing what is happening in the community can indicate which resource management problems might be serious enough to warrant the attention of a conservation education program. Especially for those who are not trained environmental specialists, however, observations need to be supplemented by the information that local people can provide.

Interviews

Two types of people can be instrumental in identifying environmental problems. First, trained natural resource specialists may be familiar with the community's environmental problems and what should be done about them. In some communities, these specialists may be found in local agricultural and forestry extension offices or regional agricultural schools; in the capital city, they may be located in agriculture and natural resource ministries and in universities. Many international aid organizations (government and nongovernment) also have natural resource management experts on their incountry staffs. The Peace Corps ICE Manual, Resources for Development, provides lists of such organizations and how to contact them.

Community members can also be of considerable help in identifying problems. These people may not be resource management specialists, but they may well have noted long-term trends that reflect environmental problems. Are trees, fish, wildlife, or medicinal plants more difficult to find now than previously? Has agricultural production decreased, does the stream flood more frequently, have people once farmed land now given over to weeds and brush, or have people been getting sick more since everyone started using a new insecticide? The development worker, in a community for only a short time, needs to learn some local environmental and social history. Community residents are usually the best source of this information. Try, however, to interview several people regarding a particular environmental situation and always include a counterpart. People tend to tell interviewers what they think the interviewer wants to hear.

Literature Review

Literature is a third source of environmental information. Appropriate national institutions and international organizations working incountry may have technical reports on relevant environmental subjects.

Headquarter offices of many international organizations also have relevant written information, much of which is free on request. Daily and weekly newspapers can also be quite useful, covering newly-passed forestry laws, the establishment of national parks, plans for oil exploration, flooding problems, and trends in agriculture, forestry, and fisheries. Eventually, such information can be usefully incorporated in conservation education programs, as well as being a means of identifying the proper focus of a program.

The following section describes some of the most important and widespread environmental issues confronting developing countries today, and how to detect their presence and significance. This description may be particularly useful for readers not versed in environmental management in developing countries.

SOME SERIOUS AND WIDESPREAD ENVIRONMENTAL PROBLEMS IN DEVELOPING COUNTRIES

DEFORESTATION

In developing countries, forests ranging from lush tropical jungles to desert scrub provide people with a wide range of valuable products. The vast majority of the people living in these countries depend upon wood for their cooking and heating fuel; woody plants also provide them with lumber; fruit, nuts, and other foods; forest animals for meat and hides; fodder for domestic stock; plant fibers; medicinal plants and other products. Additionally, forests prevent soil erosion and help maintain reliable quantities of clean water in lakes and streams. They also provide recreational opportunities and scenic beauty, many forests being popular tourist attractions.

Unfortunately, throughout the developing world, forest land is being cleared indiscriminately and at a pace far too rapid for the forests to sustain. Deforestation - the cutting and removal of trees, shrubs and other woody plants - in itself is not harmful if it is carefully controlled by people skilled in forest management. People need to cut trees for the wide variety of products they provide and to make land available for agriculture and human settlement. However, uncontrolled deforestation can be very destructive leading to both the disappearance of valued forest products and the disruption of ecological processes vital to humans and their environment.

Disappearance of Valued Forest Products

People in developing countries are cutting down forests and trees far faster than the plants can grow back. Each year 11.3 million hectares of forests disappear; by the year 2000, the forests of developing countries are likely to shrink by 40 percent. (Smith, 1981) If this continues, people will inevitably experience drastic shortages of the forest resources they depend on and may ultimately lose them altogether. Already, losses of forest resources are creating enormous human and ecological problems.

Most spectacular has been a dramatic decrease in fuelwood supplies. Today, a tremendous fuelwood shortage exists in many parts of the world, including the Himalayas, southeast Asia, the Caribbean, Central America, the South American Andes, and much of Africa. Over 90 percent of the people in developing countries depend on fuelwood as their chief source of fuel. (World Bank, 1978) Shortages force them to spend ever-increasing amounts of time searching for wood and to take every branch within reach. In some places, not a tree or bush is left standing. Where wood fuel has been severely depleted people resort to alternatives such as animal dung. Dung is a valuable agricultural fertilizer; when it is burned rather than plowed into the soil agricultural productivity suffers.

The Sahel of Africa serves as an example of what can happen during extreme cases of deforestation. There, fuelwood harvesting has completely eliminated large expanses of woody growth, resulting in a dramatic expansion of the Sahara Desert. For years it was possible for the 300,000 inhabitants of Bamako, Mali to satisfy their fuelwood needs from forests less than 50 kilometers away from the city. By 1975, this distance had increased to 100 kilometers, and it is predicted that by 1990 Bamako's fuelwood needs will require over 100,000 hectares of new forest plantations. (World Bank, 1978)

The rapid deforestation of tropical rain forests, in particular, is threatening the genetic diversity of the planet. Tropical rain forests are the most complex terrestrial environments on earth. They contain an estimated half of all of the plants and animals on earth, many of which have unknown potential for medicine, agriculture and industry. The International Union for the Conservation of Nature and Natural Resources (IUCN) reports in the World Conservation Strategy that more than 40 percent of the medical prescriptions in the United States contain a drug of natural origin, yet far less than one percent of the species in tropical rain forests have been scientifically studied for their potential value to humans. At the rate at which tropical forests are disappearing, we may very well lose such plants before realizing their potential value. We may lose untapped food sources or even cures for cancer.

With tropical deforestation, we also are witnessing the disappearance of another invaluable resource: the indigenous people who have been a part of the forests for centuries. These people have been able to survive because of a vast knowledge of the plants, animals, and ecological processes of their environment, a knowledge which western culture is just beginning to acquire. Now roads, colonization schemes, and other kinds of forest development are destroying the environments of these people, forcing them to abandon their traditional ways of life. Cultures which have developed over centuries are disappearing, along with the unique knowledge they possess.

Disruption of Ecological Processes

A growing human population needs to continually clear land for agriculture and settlements, unless it can increase production by improving the management of farmland already in cultivation. Unfortunately, however, the conditions in many tropical areas prohibit productive long-term agriculture. Indiscriminate clearing and planting, therefore, often result in ruined land and people as bad or worse off than before.

The prevalent method of small-scale agriculture in tropical rain forest areas is "shifting agriculture." For centuries, people have employed this process, which requires clearing small areas of forest and burning off vegetation and plant litter. This not only makes room for crops, but also releases nutrients from the organic material in the surprisingly sterile soil. Typically, the land is only agriculturally productive for a few years. After this time, insect pests often move in, the nutrients in the thin topsoil and plant litter are used up, and the land begins to require large amounts of insecticide and fertilizer to grow crops. The small-scale farmer frequently cannot afford either, so he must abandon the plot and clear another area of forest. If an area's population is sufficiently low to allow cleared areas to lie fallow for at least 10 years, the soil fertility can often be restored sufficiently to allow repeated cultivation. Unfortunately, increasing populations in most developing nations have increased the demand for arable land. The land is not permitted to lie fallow long enough to restore its productivity. Serious degradation of the overworked land results.

Government policies often encourage the migration of landless peasants into tropical forests. Throughout the developing world, poor people need land and a way of making a living, and establishing colonies on forest land is believed to provide both. Some countries, to strengthen claims of sovereignty, also promote settlement in remote areas near disputed national borders.

Many also encourage forest destruction unintentionally. Whenever a new road is built through the forest, large numbers of landless citizens soon follow. This would not be a problem if the land could support these human populations. Usually, however, the demands placed on the land lead to a deterioration in soil productivity, and the peasants must move further into the forest to find fertile land. The country, meanwhile, has lost forest which could have provided for citizens' needs indefinitely with proper management.

Careless removal of forests also severely damages water supplies. Rain falling upon a forest strikes leaves, branches, and leaf litter, which reduce the force of the raindrops before they ultimately encounter soil. Forest soil is made porous by innumerable microorganisms and plant roots and rootlets. It easily absorbs the rain, which filters slowly through it before eventually entering surface waterways, like lakes and streams, as groundwater. This process continually replenishes waterways and prevents extreme cycles of overabundance (flooding) and scarcity (drought). What is more, the forest plants hold the soil in place, leaving the water clean and free of eroded soil.

When the forest cover is removed, the situation changes. Nothing is left to break the fall of the rain before it hits the soil. The increased momentum, combined with the absence of roots and plant cover, is more than sufficient to dislodge soil and wash it away. All of the microorganisms, roots, and other forest components keeping the soil porous disappear along with the trees. Thus the rain does not soak into the ground; instead all of it rushes at once down the slopes into the surface water. Watersheds (areas of ground over which rainfall flows into bodies of surface water) become wildly erratic in the amount of water they contain. Sometimes fields and villages are flooded, sometimes streams dwindle to trickles, because no water reserves are maintained to enter the system gradually through the groundwater. India, for example, suffers from severe flooding as a result of deforestation in the Himalayas of Nepal. Without forest cover, the water rushes down the steep mountain slopes to the lowland villages, killing both livestock and people and destroying homes and farms. (Grainger, 1984)

Along with the loss of dependable water supplies, deforestation causes massive soil erosion. As water rushes down hillsides, it takes unprotected soil with it, leaving landscapes barren, sterile, and incapable of supporting plant life. Often the land becomes totally useless, and neither trees nor agricultural crops can grow. In developing countries such loss of precious land can cause great human suffering.

Diagnosing Forestry Problems

To determine if forest mismanagement or excessive deforestation are occuring in his site, the development worker can note the following:

- Which forest resources are being harvested--trees, medicinal plants, fruit and nuts, plant fibers, forest animals? Which products are sold; which ones are reserved for personal use? Is there an effort to control the rate at which these resources are being harvested? Do residents note whether any exploited resources are decreasing? Are there wild animals or medicinal plants which are no longer harvested because of lack of availability?

- What is the official forest management policy in the country? To what extent is it effective or being implemented? [Check the government forestry offices, and any international agencies which might know, such as the Food and Agricultural Organization of the United Nations (FAO) or USAID.] To what extent have people bothered to study the forests in the site to determine the best management practices for them? To what extent are forestry use laws known and enforced?

- What do international development agencies like FAO, the World Bank, and USAID believe the forest management problems are in the country? Do they have figures or perhaps satellite photographs that detail the reduction of the country's forests?

- Where do people obtain firewood? Do the people in the community pay for wood; if so, is it becoming scarcer and more expensive? Have people resorted to using less efficient fuels like corn stalks or animal dung? Or, have they had to begin using expensive kerosene and gas where they once used wood? Often the field staff of private development organizations like CARE, OXFAM and Save the Children have answers to these questions.

- Have hillsides been stripped of woody vegetation? Do people living on this land note a decrease in its productivity? Is this land used at all? Is soil erosion visible; do you note gullies, retreating denuded streambanks, and, during rainstorms, increased siltation in waterways?

- In dry or flat sites, do you note dust storms and other signs of wind erosion in areas where the land has been cleared of woody vegetation?

- In tropical areas where slash and burn agriculture is occurring, do the farmers note whether the productivity of their land is maintaining itself or decreasing? Do they have to use increasing amounts of fertilizer and insecticide? Inquire into the history of abandoned plots and ask residents to estimate the average amount of time a farm plot can be profitably exploited. How much forest has been cut? How much cleared land is still productive? Has any land been allowed to rejuvenate into forest? If so, how long did it take?

SOIL EROSION

Soil is essential to human welfare because virtually all terrestrial plants depend on it for nutrients and physical support. Without fertile soil, agriculture fails and people cannot produce enough food. It can take a century or more for nature to form an inch of good topsoil; yet, tragically, soil is considered throughout the world to be something that will always be available, regardless of how people treat it. In fact, whenever people clear forests, plant crops, or graze livestock they are likely to cause fertile topsoil to be carried off by wind and rainwater. This soil loss is called erosion.

Soil erosion can cause other problems besides famine. When soil washes into streams, it turns the water murky, reducing its usefulness for drinking or bathing. Floods increase in both frequency and severity (see page 15), reservoirs fill up with sediment, and costly hydroelectric projects are ruined. In dry areas, wind erosion can create vast dust storms and even cause sand dunes to grow and advance across the land, threatening agricultural land and even towns and cities.

Wind erosion is found where the soil is relatively dry and where the wind can blow unimpeded across the soil. Water erosion can occur everywhere. Serious water erosion can carve gullies in fields, and some can grow to dramatic size. On newly-cleared or gradually sloping lands, however, eroding water flow may be distributed evenly across hillsides, not concentrating in hills and gullies. This is called sheet erosion, and although it is often difficult to perceive it can carry off significant amounts of soil.

Erosion occurs everywhere, even in places unaltered by human activity. Under natural conditions, however, the rate of soil formation equals or exceeds the rate of soil erosion, so no net soil loss occurs. Problems arise, however, when humans accelerate the rate of erosion. They do this when they 1) clear plants from soil, leaving it unprotected from wind and water, and 2) overgraze livestock so that plants die and ground gets trampled. As explained in the deforestation section, pages 15-16, plant roots and plant litter, such as dead leaves, are instrumental in keeping soil in place. Consequently, when plants are removed, rain and wind can rapidly dislodge soil particles and carry them off. In North Africa, overgrazing and overharvesting of firewood have been so severe that the Sahara Desert has been expanding as a result, replacing grazing and agricultural land with rock and sand.

Soil erosion occurs in developed countries, but it is particularly severe and widespread in developing situations. This is because population and environmental pressures in developing countries force farmers to abuse land and to move onto land unsuitable for agriculture and vulnerable to erosion.

Unfortunately, much of the soil in tropical areas becomes incapable of supporting agriculture after only a few years. The soil loses its fertility, while high concentrations of agricultural crops attract outbreaks of insect pests. Farmers can combat these threats with fertilizer and insecticides, but many cannot afford what they need. And so, they continually move on, clearing new land while abandoning to nature obsolete used land. If left alone for enough time, this land can eventually recover its productivity.

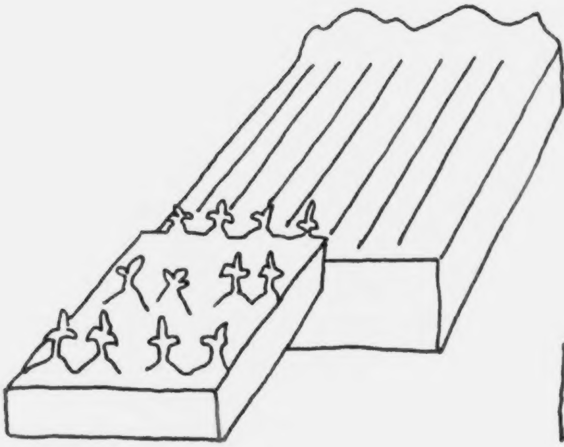
Today, however, because populations in most developing countries are expanding rapidly, it is becoming more and more difficult to find unused land suitable for agriculture. Increasingly, farmers are forced to clear land on hillsides and other lands that are not only unproductive but severely prone to soil erosion as well. Increasing human populations also contribute to wind erosion in arid zones where nomadic grazing occurs. More people means more livestock and increased grazing pressure. Accelerated wind erosion is usually the result.

Thus, erosion in developing countries is becoming more and more severe, while available productive land is diminishing. And yet, erosion can be effectively reduced by employing simple and often inexpensive measures, and farmers need to learn how to implement them and why. In the United States, the U.S. Department of Agriculture's Soil Conservation Service has extension agents across the country ready to advise farmers on soil erosion control. Few developing countries, however, have the funds or personnel available for similar soil education programs. Thus, the development worker will often discover a critical need for education programs that encourage soil conservation. Given the importance of soil to human welfare, it is hard to imagine a more worthwhile pursuit than meeting this need.

Diagnosing Soil Problems

Soil erosion is extremely common and widespread; the development worker should always watch for it wherever land has been cleared without accompanying erosion prevention measures. The Peace Corps ICE "Appropriate Technologies for Development Manuals" on Conservation of Soil and Water, and Reforestation for Arid Lands provide useful information on soil erosion and its diagnosis. Note the following:

- Are people farming on sloping land without employing soil conservation techniques (see Chapter 3, page 42)? Are they plowing up and down slopes (which encourages soil to wash away downhill) or across them (which helps hold soil in place)? Are there rills in the soil - small channels that are created by rainfall flowing downhill? Or, are there gullies, rills so large and deep that people cannot plow over them? Gullies are sure indicators of severe soil erosion, and some are so large they have actually become small valleys.



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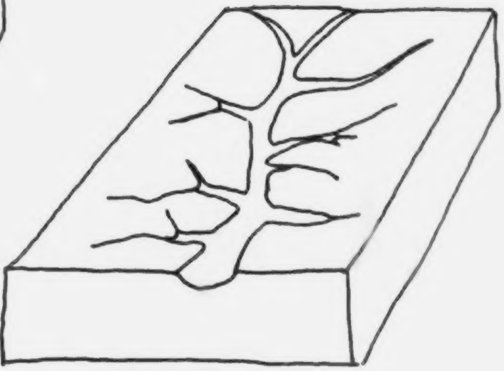

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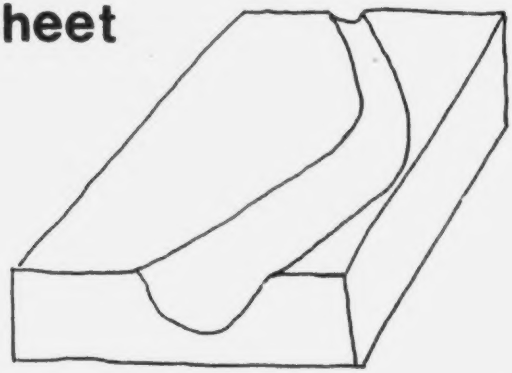


gully

- Does muddy water enter streams after storms (a sign of sheet erosion)?

- Are trees being cut, or is grass being plowed under, leaving the soil unprotected from erosion? Does the community have bare slopes dissected by rills and gullies?

- In arid or semi-arid locations, are there areas with little or no vegetation where wind is blowing the soil? Are there advancing sand dunes? Has the soil around clumps of vegetation blown away, leaving hummocks and pedestals of soil capped with vegetation?

- Are grasslands in the area so heavily grazed by livestock that considerable amounts of land are uncovered by vegetation? Are there signs of erosion caused by water or wind in the fields? If livestock is grazing in forests, have the animals stripped the ground of low-growing plants?

- Where do soil scientists say the country's most serious soil erosion problems exist? Are they occurring in your area? Check with extension agents, at the national university and agricultural schools, at the Ministry of Agriculture, and at the offices of international aid agencies.

- Are any agricultural or conservation personnel helping farmers with soil conservation techniques? What has been the official response to the country's soil erosion problems at both headquarters and field level?

WILDLIFE DEPLETION

Wildlife provides people with more than just protein: valuable wildlife products include furs and skins, primates for medical research, potential domestic animals, and special products such as ivory carvings and tortoiseshell ornaments. ("Wildlife" also includes wild plants which are also valuable in providing thatch for shelter, fiber for clothing and weaving, medicines and food. However, in this manual, this type of "wildlife" is discussed under forestry.) These resources benefit a broad range of people. Those who harvest wildlife products can either use or sell them; the "middlemen" who transport, process, and sell these products also benefit, as do the people who purchase them.

But wildlife is valuable even when it is not consumed or sold. The ecological importance of wildlife is incalculable. Among other things, wildlife species pollinate plants (important pollinators include, besides insects, various birds, bats, and even oppossums and monkeys), control pests such as insects and rodents, fertilize and aerate soil, and disperse seeds. Thus humans, by removing too many animals, can seriously disrupt the balance of nature and cause ecological, and frequently economic, havoc. Additionally, many types of wildlife, such as big game mammals, sea turtles, and colorful birds, serve as popular tourist attractions. They are integral in myth, religion, and art and are considered important components of national heritage and tradition. (Prescott-Allen, 1982)

Wildlife Management Problems

The health of a wildlife population is closely tied to that of the environment. Thus when humans mistreat the environment, wildlife suffers. When forests are destroyed, watersheds are clogged with eroded soil, or the environment is contaminated with poisons, fish and wildlife lose the food, clean water and shelter they need. Sound environmental management, therefore, benefits wildlife which depends on a healthy environment to survive.

Another threat also confronts wildlife - overexploitation. Paradoxically, despite wildlife's value, developing countries spend little effort in managing it. Rather, the tendency is to harvest as many wild animals as possible, regardless of the effect on the resource. In fact, wildlife, like the forest itself, needs to be managed on a sustained yield basis. That is, only a certain number of animals should be taken, so that enough animals remain to reproduce and maintain the population. Failure to control harvest rates severely threatens the future of wildlife resources.

There are many reasons why intensive and uncontrolled hunting pressure, rather than sound wildlife management, is typical of developing countries. First, there is usually a lack both of ecological information about wildlife and of people trained to obtain it. To be able to harvest the proper number of animals from a wildlife population, it is necessary to know many factors: What are the animal's food, water, and shelter requirements? How many individuals can the environment support? When and how fast does the animal reproduce? Obtaining this information requires trained biologists and the funds and administrative support to back them up. All are typically in short supply in developing countries.

Secondly, people usually feel a great deal of pressure to harvest wildlife at high rates for immediate gain. For some, the issue is as simple as either killing wildlife or going hungry; for others, restricting a harvest can mean substantial income loss. Many people living along rivers, for example, depend entirely upon the sale of fish for income.

This pressure to take as many animals as possible can sometimes lead to harvesting methods that excessively damage wildlife populations. For example, harvesting fish with dynamite is effective, but leaves few fish to reproduce, damages the environment, and needlessly kills other species that may be of indirect benefit. Thus, in the long run, dynamite can reduce fish harvests.

It is, of course, in people's long-term interest to maintain healthy populations of the wildlife they harvest. But, the problem is that wild animals are common property. Thus if one person limits his harvest of animals, there is no guarantee that others will not move in and take the animals themselves. The person restraining himself has suffered, but wildlife numbers remain the same. Controlling everyone's harvest is required, for the sake of the community's long-range interest, but more is needed than people's understanding and cooperation. Also required are data on which to base catch quotas and methods, and effective laws and enforcement. These are often insufficient in developing countries.

Sometimes the commercial value of a wild animal is so great that people go to great lengths to catch it. Such animals include spotted cats like jaguar, leopard, and cheetah that are hunted for their fur; crocodiles for their skins; sea turtles for their shells; primates for medical research; rhinoceri for their horns, and large and colorful parrots to serve as pets. The rarer the animal, the higher the price, and the harder people try to find it. Many of these highly-sought animals are in danger of becoming extinct. This problem is as much a result of the demand in consumer countries as it is of inadequate wildlife management in developing ones.

In short, wildlife in most developing countries is almost invariably managed inadequately, if at all yet, in many situations, the continued health of wildlife populations is critical to people's well-being. For this reason, the development worker can often justify devoting some attention to encouraging sound wildlife management.

Diagnosing Wildlife Problems

Understanding whether there is a wildlife management problem in a particular area largely depends on determining whether the numbers of wildlife are declining because of human actions and whether this disappearance threatens the survival of the resource or the welfare of the people who depend on it. This can be difficult to determine, because low numbers of fish and animals do not necessarily mean that a problem exists. Some environments naturally support few animals; some animals are naturally rare or secretive. If fishermen in the community are bringing in what seems like meager catches, for example, overfishing is not necessarily the cause.

A trained wildlife ecologist may be able to assess the environment, determine how many animals it can support and how many it does, and reach some conclusions. In the absence of technical expertise, however, other evidence must be relied upon.

- What are the population trends for fish and wildlife in the community? Ask community residents, hunters and fishermen, and, if available, wildlife biologists whether they have noticed a significant decline in the numbers of fish and wildlife. If so, do they have any ideas about the causes? Have people noted an increase in access to hunting and fishing areas, or increased deforestation, soil erosion, and use of insecticides? Is the decline in wildlife numbers causing any hardship for community residents? Are hunters having to travel farther to satisfy their needs?

- Is there any attempt to manage fish and wildlife in the community? Has anyone from the country's university or wildlife agency, or from a foreign institution, developed a management program or recommendations, or attempted any wildlife research which could be used in a management program?

- Does the country have any laws regulating wildlife harvest? If so, are they enforced? Some countries, in an effort to control the taking of wildlife in the absence of adequate management data, pass laws which forbid practically all hunting. Such laws are frequently ignored.

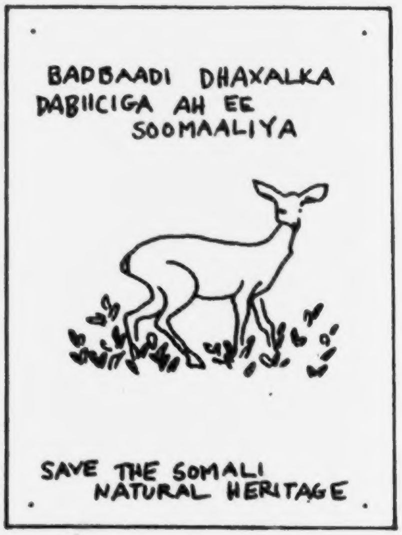
- Has the country signed the Convention on International Trade of Endangered Species of Wild Flora and Fauna (CITES) which regulates worldwide traffic of animal products and prohibits trade in products derived from endangered species? If so, are regulations being enforced? Are the country wildlife and law enforcement agencies aware of the regulations? Can one easily purchase such endangered-species products as sea turtle shells, spotted cat furs, and elephant ivory in curio shops?

- Are people in the community harvesting endangered species?

- What kinds of wild flora and fauna are valuable to people in the community?

- Do people in the community harvest fish with dynamite or poison?

- If the community is experiencing severe deforestation, massive soil erosion and watershed siltation, or the reckless use of insecticides, it is likely that fish and wildlife are being adversely affected.



MISUSE OF INSECTICIDES

Insect pests are a common problem for farmers throughout the world. Uncontrolled, they can produce severe crop loss, something very few farmers in developing countries can afford. For this reason, farmers usually choose to control insects with chemical insecticides if they can pay for them. However, using these chemicals carelessly can lead to serious human health and environmental problems.

Insecticides are dangerous poisons, toxic not only to insects but to humans and other creatures as well. Yet in developing countries these chemicals are often used and stored without regard to safety precautions. This can happen for several reasons. Frequently pesticide directions and precautionary labels are not translated into appropriate languages; when they are, farmers with low levels of literacy often cannot read them. Agricultural extension agents who can train farmers in insecticide use are often few and far between and many themselves lack adequate knowledge of safe and effective insecticide use in a particular area. In any event, the farmer can often obtain insecticides over the counter at the local market or drug store and never encounter an agricultural agent.

Insecticide poisoning can occur when the chemicals are ingested through the nose and mouth or absorbed through the skin. The immediate symptoms of mild organophosphate poisoning resemble flu or head stress - headache, nausea, cramps, and excessive perspiration. Large doses of some chemicals can be fatal, while some pesticides can promote cancer, as well as disease of the liver, the kidney, and the nervous system.

Most obviously, poisoning occurs when pesticides are sprayed near people. But poisoning can also occur days after an insecticide has been applied, because residues can remain in the air and on the vegetation. Insecticides can also wash off the fields during rainstorms and enter the surface water that people drink and bathe in. Additionally, people can inhale or swallow insecticides if they have not cleaned up properly after using the chemicals or if empty pesticide containers are used to hold food or water.

Environmental Hazards

While appearing to offer a straightforward solution to insect damage, insecticides can also drastically disrupt the environment in several ways.

Many insecticides eliminate both beneficial and harmful organisms. Thus they not only affect injurious insects, but also insects that pollinate trees and crops, serve as food for fish, birds and other animals; recycle soil nutrients and prey on crop-eating insects themselves. With beneficial insects gone, agricultural conditions may actually deteriorate in the long run.

Many chlorinated hydrocarbon insecticides, such as DDT, are widely used because they are cheap and last a long time, as they do not break down, but remain intact in the environment for years. Rainfall runoff can wash these insecticides from fields into surface water, where they accumulate in mud, or enter the food chain as they are absorbed and ingested by aquatic microorganisms. Larger animals eat these animals and are eaten, in turn, by still larger ones until the process ends with a large bird, a fish, or a human at the end of the "food chain". These hard insecticides, meanwhile, have been passed along up the food chain as well, higher concentrations accumulating at every stop. As a result, the predators at the top of the food chain, like humans, end up with the highest concentrations of these insecticides in their bodies.

Large concentrations of some hard insecticides in body tissues can kill animals outright or make them incapable of reproducing. In humans, some of these insecticides are suspected of causing cancer, liver problems, and other diseases. Because of the serious environmental and health impact of chlorinated hydrocarbons, the United States has banned or severely restricted the use of most of them. Yet, the development worker may frequently encounter them in countries which lack these restrictions.

Many insect pests have developed resistance to insecticides over time. This has forced farmers to apply increasingly larger quantities of the poisons, particularly the relatively inexpensive chlorinated hydrocarbon insecticides which amplifies their detrimental effects and costs additional money. In some places, "super" races of insects have developed, able to withstand any reasonable dose of certain insecticides. Furthermore, because insecticides kill beneficial insects as well, farmers often lose the predators that control the pests naturally. The result can be unprecedented crop destruction, because pests are often more prolific reproducers than predators. Destroying predatory insects can allow what were formerly minor crop pests to become major crop problems.

Diagnosing Insecticide Problems

Health Hazards

The first step in determining whether communities have health problems related to insecticide misuse is to find out what insecticides are being used. Identifying the chemicals people are using can reveal the potential for health and environmental damage. Unfortunately, identifying insecticides is not easy, because the same chemical can be marketed under many different local names in English, German, and other languages. The best way to identify what is being used, then, is by noting the insecticide's chemical composition and then by checking both the chemical composition and the common name with an agricultural professional, such as an extension agent or researcher. Insecticides can also be found listed in the Farm Chemicals Handbook (Meister Publishing Company, 37841 Euclid Avenue, Willoughby, Ohio 44094). Agencies with agricultural advisors in developing countries often have this book. The U.S., Canadian, or British foreign missions or other international aid organizations such as the United Nation's Food and Agricultural Organization (FAO) or the World Bank may also have a copy. Information can also be obtained through Pesticide Action Network (PAN) International. PAN International is a worldwide coalition of non-governmental organizations working to end pesticide related damages to human and environmental health. The North American Regional Center for PAN is located at 1045 Sansome Street, Room 404, San Francisco, CA 94111.

A knowledge of the specific insecticides being used is preferable, but not absolutely necessary. If a community is experiencing insecticide problems, it can be made evident through a few observations:

- Do people suffer from symptoms that resemble those caused by insecticide poisoning--headaches, nausea, cramps, abnormal perspiration, possibly even nerve degeneration like tremors and loss of muscle control? Young children are especially susceptible. Is there a correlation between these symptoms and insecticide exposure, i.e. are more people getting sick who are exposed to insecticides than those who are not? Do more people get sick during times of the year when spraying is occuring? Perhaps a local doctor or agricultural extension agent can help determine this. However, even if a problem exists, these professionals may be unaware of it; poor people often do not report these symptoms; when they do, the symptoms are often diagnosed as a cold, the flu, or a "bug".

- Are the insecticides used accompanied by application instructions in a language people can understand? Can the people using insecticides in the community read?

- Are pesticides frequently used without proper safety precautions? Are they often applied with defective equipment (such as leaky backpack sprayers)? Do the people using them adequately appreciate that they are dangerous poisons?

- Do the agricultural extension agents in the community realize the importance of handling insecticides carefully? How do they communicate this to the community's farmers?

- What do national and foreign agricultural experts say about how insecticides are used?

- Do people often spray insecticides in residential areas and near water supplies? How and where do people clean their spraying equipment? The use of water supplies near spray areas is often the link to serious community health problems. Identification of these water areas can lead to a strategy to reduce insecticide misuse.

Environmental problems caused by improper insecticide use are very difficult to determine, because most of the effects are only evident over a long period of time. Acquired resistance of insect pests to insecticides, physiological changes in wild animals, and serious ecological disruption can only be seen over time. Nevertheless, you might note the following:

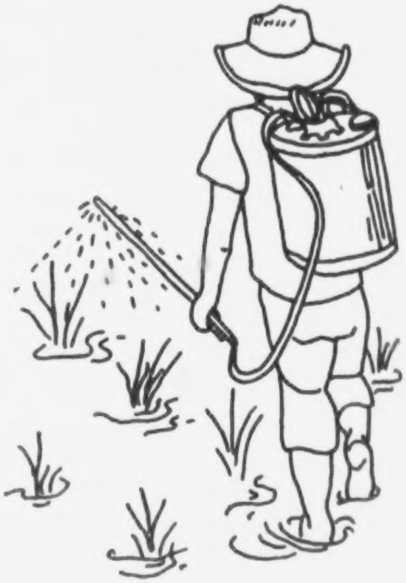
- Have dramatic fish kills occurred in water that could have received heavy insecticide dosages? The use of insecticides near any surface water can lead to environmental problems.

- Is the community using chlorinated hydrocarbon insecticides such as DDT, dieldrin, heptachlor, or endrin? These are capable of causing severe environmental damage and have been essentially banned in the United States for that reason. Does the country have any insecticide import restrictions? (Very few developing countries currently do.)

- Have agricultural experts, national or foreign, noted any environmental problems caused by insecticides? How do they feel about the country's insecticide import policy? Do any agricultural offices have reports describing insecticide use in the country?

- Do farmers complain that they have to use more insecticides every year (in response to increasing pest resistance), or that beneficial insects, such as bees, are becoming scarcer? Do they complain that commercial or backyard beehives are being destroyed by insecticides?

- Have new insect pests emerged as problems since insecticides have been in use? Such emergence of new insect pests is a strong indication that insecticides are not being used properly.



ABUSE OF PARKS AND PROTECTED AREAS

Nearly all countries, regardless of economic development level and political system, have established national parks and other categories of protected areas such as biological reserves, wildlife refuges and national forests. National parks generally preserve representative samples of natural ecosystems intact, while allowing carefully controlled human use. Wildlife refuges, on the other hand, are managed to favor certain wildlife species and may feature significant habitat manipulation. National forests are frequently multiple-use areas where wildlife is hunted, recreation is encouraged, livestock is grazed, and watersheds are managed, all on a sustained-yield basis.

Dr. Kenton Miller, in his book Planning National Parks for Ecodevelopment, lists the following 13 different protected area objectives derived from the experiences of many countries:

- Maintaining large areas as representative samples of each major biological region of the nation in its natural unaltered state.

- Maintaining examples of the different characteristics of each type of natural community, landscape, and land form to protect the representative as well as unique diversity of the nation.

- Maintaining all genetic materials as elements of natural communities, and avoiding the loss of plant and animal species.

- Providing facilities and opportunities in natural areas for purposes of formal and informal education, research, and the study and monitoring of the environment.

- Maintaining and managing watersheds to ensure an adequate quality and flow of fresh water.

- Controlling and avoiding erosion and sedimentation, especially where they are directly related to downstream investments which depend upon water for transportation, irrigation, agriculture, fisheries, and recreation, and for the protection of natural areas.

- Maintaining and managing fishery and wildlife resources for their vital role in environmental regulation, for the production of protein, and as the base for industrial, sport, and recreational activities.

- Providing opportunities for healthy and constructive outdoor recreation for local residents and foreign visitors, and serving as poles for tourism development which are based upon the outstanding natural and cultural characteristics of the nation.

- Managing and improving timber resources for their role in environmental regulation and providing a sustainable production of wood products for the construction of housing and other uses of high national priority.

- Protecting and making available all cultural, historic, and archaelogical objects, structures and sites for public visitation and research purposes as elements of the cultural heritage of the nation.

- ° Protecting and managing scenic resources to ensure the quality of the environment near towns and cities, highways and rivers, and surrounding recreation and tourism areas.

- ° Maintaining and managing vast areas of land under flexible land-use methods, which conserve natural processes to ensure open options for future changes in land use as well as the incorporation of new technologies.

- ° Focusing and organzing all activities to support the integrated development of rural lands, giving particular attention to the conservation and utilization of marginal areas and to the provision of stable rural employment opportunities.

Parks and protected areas, then, can be valuable to a country's future. Unfortunately, enormous human pressures in developing countries often threaten them, as they do forest, soil, and wildlife resources. Poor people, struggling to survive, naturally are drawn to exploiting protected areas that have the land, water, trees, wildlife and medicinal plants they need. Reserves in developing countries are often violated by land squatters and people living nearby who clear them for farming and harvest their resources.

Developing countries sometimes are not able to effectively resist these pressures, because their protected areas are poorly managed and controlled. Frequently, reserves exist only on paper, ownership of the land remaining in private hands. Even if nationally-owned, many reserves have no effective management plans. What is more, even with adequate management plans, developing countries often lack enough trained personnel and funds to implement the plans. In fact, in some reserves there may be no personnel at all, thus precluding any effective management and enforcement of regulations.

Even working at a village level, the development worker may find it appropriate to develop conservation education programs that lead to the improved management of reserves, because such reserves may be beneficial locally as well as nationally. Many reserves allow controlled resource harvest; others, protecting watersheds, ensure reliable supplies of clean water to downstream areas. Still others, although they allow no resource harvest, provide recreational opportunities and income generated by tourism to neighboring communities.

Diagnosing Park and Protected Area Problems

To determine whether there are opportunities for involvement along this line, the development worker should note the following:

- Does the country have any designated national parks or protected areas? If so, what are their objectives? Are they potentially valuable to the community you are serving?

- If a reserve is nearby, visit it and answer the following questions:

  1. How many personnel are assigned to the reserve?
  2. Is there anything -- signs, personnel, buildings, brochures, fences, etc. -- to indicate the purpose or even the existence of the designated reserve? If you cannot find any evidence, chances are the people who live nearby will not be able to find it either.
  3. Are incompatible activities underway such as colonization, hunting, agriculture, tree and wild plant harvest that clearly violate the purposes for which the reserve was set up?
  4. If personnel are stationed in the protected area, do they have an effective working relationship with the people in your community? Do they consider the needs of adjacent communities when planning the park's management? Do these communities understand how the reserve can benefit them?
  5. Is there litter, vandalism or other evidence of a lack of interest in and respect for the park?
  6. Are there sanitary facilities? If so, are they well-placed or are they too close to water sources?
  7. What is the extent of public interest in the welfare of the country's reserves? How do private conservation organizations, local residents, university teachers and students, the press, resource management agencies, national and local government offices, and law enforcement agencies feel about the reserve? (These groups, and others, may be able to contribute significantly toward seeing the reserve treated wisely).
  8. Are there conservation organizations in the country that could help identify problems concerning the establishment and management of reserves and their solutions? Besides the national groups mentioned above try discussing the matter with international organizations which might have representatives in the country, such as FAO, IUCN or World Wildlife Fund.

SUMMARY

The conservation educator should begin his efforts by listing the most pressing environmental problems in his particular community. The list should be based on information gathered from first-hand observations, conversations with community residents and technical experts, and relevant literature.

To determine if conservation education can address the identified environmental problems, the problems need to be considered carefully. Some problems, no matter how pressing, may prove too immense for the development worker to approach. Others may not be subject to change through conservation education. Some questions to consider are listed below.

° WHAT ARE THE MAIN ENVIRONMENTAL PROBLEMS CONFRONTING THE COMMUNITY?

° WHAT IS THE SCALE OF THE PROBLEM?

Local - contained within a particular community. A problem can be common throughout the world, but also local in scope. Uncontrolled deforestation is a worldwide problem and a local one, as well, for a community facing fuelwood shortages and soil erosion.

Regional - contained within a particular area, a natural region such as a watershed, or a political region such as a department or province.

National - involving all areas of the host country.

International - involving resources which cross political borders - involving exchanges, marketing, etc.

° IS IT PRACTICAL TO CONSIDER ADDRESSING THE PROBLEM?

- WHAT SORT OF AWARENESS EXISTS ABOUT THE PROBLEM? Do people recognize that there is a problem? Are they concerned about it? Are they looking for ways to solve it?

- WHAT IS THE CAUSE OF THE PROBLEM? Try to determine why it is occurring. What is the motivation for taking the actions resulting in environmental problems? Is it ignorance, satisfying basic needs, a desire to generate an income?

- HOW SERIOUSLY DOES THE PROBLEM AFFECT THE PEOPLE WITH WHOM YOU ARE WORKING?

- IS THERE A FEASIBLE TECHNICAL SOLUTION TO THE PROBLEM? See Chapter 3.

3

Technical Solutions to Environmental Problems

INTRODUCTION

This manual assumes that conservation education itself can be a solution to many environmental problems. However, an education program can only be effective if it is advocating appropriate technical solutions to those problems. Implementation of technical solutions is the final goal of conservation education efforts. Identifying feasible solutions is crucial to eventual program success, because the program's content and target audiences will depend upon them.

Conservation educators cannot conduct effective education programs without knowing what they want people to do as a result. Often, however, conservation educators fail to clearly define their objectives. Instead, they may begin by teaching something that seems appropriate and interesting, usually a general appreciation of ecology and nature. However, a general appreciation will not, by some alchemy, cause people to plow on the contour and manage their forests properly. In poorly planned programs the connection between the environmental message and any environmental consequences is tenuous at best.

Teaching a farmer to appreciate the beauty of the forest on his land, for example, will not stop him from cutting it down, if he feels that is the best way to feed his family. Far more effective would be to show him how to manage it profitably in a way that causes minimal environmental damage. If the conservation educator has no practical alternative to offer the farmer, he cannot expect the farmer's behavior to change.

Likewise, teaching school children in the capital city about wildlife may not benefit the wildlife if those doing the hunting are nomadic tribesmen. The schoolchildren may become concerned, but if there is nothing they can do to affect the hunting, then the educational program will not produce environmental results.

Showing people how auto exhaust can harm human health and the environment may increase their interest in curbing pollution; in a poor country, however, catalytic converters will most assuredly be impractical. The net result of such an education program: aware people, but no improvement of environmental conditions.

Thus the conservation educator has to know what realistically can be done to improve the environmental situation, and her educational effort should be focused on bringing this about. She cannot expect to change people's behavior without knowing what she wants them to do. She has to clearly define how her efforts will lead to an improvement of environmental management.

GUIDELINES

Some solutions, like following instructions for proper insecticide application or implementing basic, well-proven soil conservation measures, are relatively simple. Others, like implementing effective tropical forest or wildlife management programs, require a great deal of data and technical know-how. Adequate data and expertise, however, are usually scarce in developing situations, often precluding the implementation of desirable environmental management practices. The development worker may encounter moments of frustration when searching for practical alternatives to unsound environmental practices. At times he may have to settle for less-than-ideal solutions.

It is important to locate people who can assist in identifying realistic solutions to environmental problems. Two information sources may be helpful. The first is institutions, both national and international, with trained personnel. Useful national institutions can include universities, agricultural extension offices, and ministries of agriculture, forestry, and health. International agencies with people trained in natural resource management include foreign aid organizations--USAID, the Food and Agricultural Organization of the United Nations (FAO), and the World Bank--and various private voluntary organizations (PVOs)--Catholic Relief Services, Save the Children, CARE, OXFAM, Africare, and others.

Resource management and conservation organizations in the United States and elsewhere can also help. They can send literature and information and may have people familiar with the situation who can help through correspondence and perhaps even visits. The Conservation Directory produced annually by the National Wildlife Federation in Washington, D.C. lists such organizations providing brief descriptions of their primary activities and addresses.

A request for information or assistance from any of these organizations should be as specific as possible in describing the problem, the community's resources and the assistance needed. A detailed request is much more likely to elicit an appropriately tailored response.

"Generalist" conservation educators should not hesitate to evaluate the technical solutions being advocated by experts in light of what they know of the community. Often, such experts are so removed from the social factors influencing a problem that their solutions can be unrealistic. It is a common error for resource management efforts to employ a "top-down" approach in implementing community-level projects. Frequently, a management agency will develop a solution in the central office and then present it to a rural community, expecting the people to accept and implement it no questions asked. The conservation educator may be able to provide expert planners with valuable information that leads to the design of more appropriate technical solutions. In fact, technical solutions may have to be continually revised throughout the project to ensure that they are viable in the context of a particular community.

It should be no surprise that the second source of information for help in identifying technical solutions will be the people who are to be the focus of the education program. There are two reasons for this. First, any solutions to be advocated by the education program will have to be acceptable to the people being educated. People generally have no commitment to solutions that do not reflect their input and participation. Thus it is critical to know their preferences and concerns. A reforestation effort must be based on a knowledge of whether people prefer trees that provide firewood, forage for livestock, fruit, lumber, or shade. It is important to know whether they prefer certain tree species for each use. The only way to know is to ask the people who will actually be planting and using the trees. For example, in developing countries, it is often the women who handle tree planting and harvesting chores. The opinions of their husbands regarding the proper trees to plant may not reflect the community's real needs.

Secondly, the people being educated possess a great deal of knowledge about local conditions. Often, there are good reasons for doing what they do, based upon generations of trial-and-error. They may not have undergone formal training or have college degrees, but they probably have learned about their environment through experience and tradition. Their knowledge can provide the foundation on which to build a truly appropriate education program.

The following brief discussion provides an overview of some practical environmental solutions to the environmental problems described in Chapter 2. It is by no means a detailed technical guide, but is rather an aid to determining which approach might be appropriate for a given situation. Detailed information on implementing specific technical solutions can be found in a number of manuals listed in the bibliography.

DEFORESTATION

The ideal solution to the disappearance of forest resources is to manage them on a sustained yield basis. That is, people need to harvest resources only as fast as they can be replenished and in a way that does not damage the environment which produces them. In this manner, people can consume natural resources, but still be assured of a continued supply. When people harvest forest resources faster than they can grow back, the resources inevitably disappear.

Unfortunately, in the vast majority of cases, not enough is known about the forests in developing countries to be able to manage them for sustained yield. In fact, a 1984 U.S. Congressional Office of Technology Assessment Report on tropical forest management concluded that not a single tropical forest has ever been successfully managed in such a fashion. Much additional research, funding, and technical training are needed before sustained yield forest management becomes widespread. The development worker, then, will almost certainly not have the necessary technical information available to encourage sustained yield forestry.

The most feasible solution to the reduction of forest resources, then, will probably be planting trees (called reforestation when planting trees where they have been previously, and afforestation when planting where no trees have been). Planted and managed trees can do much for a community: provide fuelwood, timber, fruit, and fodder; protect the soil from wind and water erosion, prevent watershed siltation, and help relieve natural forests of harvesting pressure. Some trees and shrubs can grow remarkably quickly on poor soils and in arid conditions and provide several different products at once. Many tree species are available to suit a wide range of needs, and care is required to select the trees or shrubs best suited to each community's particular soils, climates, economic needs, and social preferences. Naturally, the people in each community should play an integral role in selecting the types of trees and shrubs best suited for them, if they are going to be doing the planting, cultivating and harvesting.

Another effective and practical solution to fuelwood depletion is the use of more efficient stoves and burning practices, both of which can significantly reduce the amount of wood needed for cooking. Much research is being conducted at present into improving stove effectiveness and into developing stoves which burn materials other than wood, such as garbage and crop refuse, that may be cheaper and more accessible. Some new stoves even employ solar power.

Agroforestry is the term used to describe a system of growing tree crops along with agricultural crops. Farmers can thus use the same land to produce field or vegetable crops and, after some years, trees as well. Each site requires an agroforestry program specially designed for its specific characteristics, so considerable technical input is usually required. Nevertheless, many agroforestry efforts are being implemented around the world, and much interest in agroforestry exists. The development worker should be able to find the technical support needed to implement an agroforestry project, at least on a small scale.

Controlling access to forests can also effectively prevent forest resource destruction. To ensure long term productivity, land should only be put to the use for which it is suited. Nevertheless, sites for new roads and settlements are often chosen without considering whether the land becoming accessible can support the settlers who will inhabit it. Typically, people move into a virgin area, cut down and burn potentially productive forest, and plant crops. However, those farms and settlements are doomed to failure if the soil or slope of the land cannot withstand this level of human activity. The people who rely on the land eventually suffer reduced yields of both crops and forest products, while the country loses forest resources that could have, with proper management, provided jobs and useful products indefinitely.

Forest reserves can safeguard watersheds, ensure continued production of forest resources, and keep rare plant and animals species from disappearing. As discussed under the parks and reserves section, however, (page 31) managing such places in developing countries can be a challenge. In addition, government action at the national or regional level is usually required to establish new reserves.

SOIL EROSION

The best way to manage soil is to use land only for the purposes for which it is best suited. To determine how a tract of land should be used, soil and land use specialists should survey the area and develop a soils map. The most versatile type of land is flat with deep fertile soils; other types of land, such as hillsides or terrain covered with shallow or infertile soils, should only be used for certain purposes while employing effective soil conservation measures. For example, while intensive agriculture may be appropriate on a level river floodplain, the slopes on either side might best be planted in grass for grazing or, if very steep, left in forest cover. Using land within its limitations can ensure that it will provide for human needs indefinitely. Misusing land will result in the loss of its productivity.

Unfortunately, many developing countries have had little of their land evaluated for its capability, while those which have gathered adequate data often lack the services to bring this information to the farmer or to influence farming practices. Consequently, the way land is used in developing countries is usually not based on the land's characteristics. The development worker may find it appropriate to serve as a catalyst for the gathering of land capability information or, if it already exists, to encourage farmers to treat their land according to the restrictions indicated by the information.

To conserve soil, various techniques can be used. These include contour plowing, stripcropping, stabilizing gullies with plantings or check dams, mulching, rotational cultivation, controlling grazing, reforestation, and simply leaving land covered with grass or forests. Wind erosion, in particular, is usually controlled by planting grass and woody plants that can hold the soil in place, act as windbreaks, and even stabilize advancing sand dunes.

Technical expertise will be required to select the conservation measures appropriate for each situation. Several techniques are relatively simple to implement; others, such as building ponds and dams, require substantial technical input. Many of the simplest measures are very effective, and the development worker typically stands a good chance of finding enough technical assistance to be able to use them. Nevertheless, while technical solutions may be available, tradition, the use of certain farm tools and animals, and the need to survive on a daily basis may limit their implementation.

WILDLIFE DEPLETION

Encouraging sound management of forests, soil, and coastal resources and the proper use of insecticides will all substantially benefit wildlife. Additionally, as explained earlier, wildlife should be harvested on a sustained yield basis in controlled seasons, with techniques that damage the environment and resource as little as possible.

At the community level, the conservation educator can implement programs that significantly benefit wildlife resources by doing the following:

1. If there are laws, and if they are enforced, the development worker can help explain why following

them is in the community's long-term interests. The taking of and trafficking in endangered species has to stop for the future of the resource. However, if wildlife laws are not enforced, it cannot be expected that people will follow them (see page 22).

2. Should more ambitious programs prove impractical, the development worker may find it worthwhile simply to develop in people a respect for wildlife and interest in its welfare. This can lead to improved treatment of wildlife and to greater adherence of sound wildlife regulations, once they are developed and enforced.

MISUSE OF INSECTICIDES

The best way to reduce health damage due to insecticides is to teach people to handle insecticides properly. It is critical that people follow recommended safety precautions and avoid insecticide application that threatens residential areas, farm workers, and water supplies. Safe disposal of leftover pesticides and empty pesticide containers should also be stressed.

To minimize environmental damage from insecticide use, it is best to control insects using integrated pest management techniques (IPM). IPM combines the use of a variety of mechanical, cultural and biological pest control methods with the minimal use of pesticides as backup. Some successful techniques include using biological control agents such as predatory insects, changing planting and harvesting timetables and methods, using pest-resistant crop species and varieties, and manipulating environmental characteristics to discourage the presence of pests. IPM is a new field, and although innovative methods are regularly being introduced, much research is still needed, particularly in developing countries.

Unfortunately for the development worker, IPM techniques, like techniques used for sustained yield management of tropical forests (page 39), are site specific. To use them successfully, the development worker must have sufficient data about a site, which may not already exist. In the absence of the data needed to design an integrated pest management program, the best option may be to find effective and economically feasible alternatives to chlorinated hydrocarbon insecticides and to encourage farmers and agricultural extension agents to use them. The technical assistance required to do this should be available through the agricultural organizations and agencies active in country.

ABUSE OF PARKS AND PROTECTED AREAS

Much can be done at the national level to encourage the establishment and effective management of national parks and protected areas. Inventories of the country's natural resources are a first step in determining what kinds of resources exist and where. Such inventories can provide guidance for planning park systems, as well as individual protected areas. Enabling legislation, providing a mechanism to set aside and protect land, is usually a prerequisite to establishing a park system. Then personnel need to be trained to manage the areas, land has to be purchased or other arrangements made according to the specific objectives of the conservation unit, and effective management strategies must be developed.

The development of a sound management plan will be to no avail unless it can be implemented in the protected area itself. Planning teams should include local residents to the extent possible. Unless it is remote and unthreatened, the site should have full-time professional staff to manage and protect it. Invariably, it will also need the cooperation of the people living in or near it. These people should be encouraged to observe the reserve's resource exploitation restrictions, and they should know how the park can benefit them. Reserve personnel, in turn, should allow the area to serve the needs of the local residents as much as possible without compromising the reserve's objectives.

Enforcement of regulations will be necessary, but it will be significantly more effective and pleasant if the people being affected understand the reasons for the regulations and how the reserve can benefit them. An effective working relationship, characterized by two-way communication, is essential.

SUMMARY

Conservation education's goal is to encourage the implementation of solutions to environmental problems. Thus it is critical to identify effective and feasible environmental solutions if environmental results are to be achieved. The following questions may help in identifying practical solutions.

° ARE PEOPLE AWARE A PROBLEM EXISTS?

° WHAT IS THE IDEAL SOLUTION TO THE ENVIRONMENTAL PROBLEMS CONFRONTING THE COMMUNITY?

° HAS THIS SOLUTION BEEN DEVELOPED WITH SUFFICIENT TECHNICAL ASSISTANCE AND LOCAL INPUT?

° WHAT RESOURCES ARE NEEDED TO CARRY OUT THE SOLUTION?

- Financial: Is an investment of money required? Where can it be obtained? (Ministry, foreign donor, community fund raisers, etc.)
- Human: How much labor is needed? Are workers willing, available, and adequately trained?
- Material: What building supplies and other materials are needed? Are they available locally? If they must be obtained in another location, is there enough time and money allocated to the task?
- Time: How long will it take to implement the solution? If it is a long-term project, can it be broken down into phases or steps that allow the community to feel a sense of progress toward the final goal?

How can these resources be obtained?

° WHO WILL HELP IMPLEMENT THE SOLUTION? See Chapter 4.

4

Identifying the Audience

INTRODUCTION

The environmental problems to be dealt with, and their solutions, have been identified; now, the people who will actually implement these solutions must be identified. These people will constitute the education program's target group(s). In identifying these groups, the development worker must consider not only the people directly causing the problem, like the farmer producing soil erosion or the hunter overharvesting wildlife, but also the community members who can influence these people as well. It may be necessary to go beyond farmers, for example, to reach government officials, the general public, or influential community leaders. There may, in fact, be several target group possibilities, with the most obvious not always being the most appropriate. People in a position to support or initiate wise environmental management who are not effectively doing so are as much a target for education as those who directly cause degradation. What is more, an education program may best be focused on several different audiences.

An education program cannot be expected to produce desired environmental results if directed at the wrong people. With this in mind, some guidelines are provided here to help the reader sort through target group possibilities and focus on the ones that can make a difference.

GUIDELINES

The target group of a conservation education program must be able to:

- significantly contribute to an environmental problem's solution; and
- perceive the behavior changes advocated by the education program as being in its best interests.

It is crucial to identify target groups that meet both of these requirements in order to achieve the desired environmental results. The development worker needs to approach this task with as few preconceptions as possible. The target group possibilities are virtually endless; some groups, however, appear frequently enough to be mentioned here:

> People directly affecting natural resources. This is usually the easiest group to identify. They can be seen cutting down trees, overharvesting fish and wildlife, misusing pesticides, and neglecting to use soil conservation measures. Unfortunately, they are frequently cast as the primary villains on the environmental scene, even though they often have few alternatives to doing what they do. Conservation education programs directed at these people are frequently most appropriate when they offer specific methods for managing resources and explain why it is in the community's best interest to do so.
>
> Extension Workers or Resource Management Educators. As a rule, these people work for forestry, agriculture, or other national extension services. They usually do not harvest natural resources themselves, but introduce new products and techniques to those who do. The development worker, therefore, may find it appropriate to assist extension agents with conservation education programs or even to help train them in environmental management. Involving extension workers in education efforts can maximize the program's ultimate impact, since those workers can reach many more people. They can also effectively establish communication links between community residents and distant, but significant, government officials and other decision-makers. Through these fieldworkers, the conservation educator can also create a capacity to maintain the program once he has left.

Local Leaders, Government Officials. Government officials and local leaders can significantly affect environmental management both by passing and enforcing laws and by initiating and supporting projects that affect natural resources, for better or worse. They are responsible for projects to construct dams and roads, colonize large tracts of land, encourage or discourage reforestation; they fund health, sanitation, education, and extension programs; and they act to establish parks and reserves. To deal effectively with this group, the conservation educator needs to determine which government officials and agencies can affect the environmental problems at hand and how. The funding, interests, official mandates, and unofficial impact of personnel and agencies needs to be understood. Casting a wide net when considering government agencies and local officials can ensure that none are unduly neglected.

Influential Community Members. These people can be members of the political party in power or community residents who are respected and listened to. The development worker should spend the time to identify these "opinion leaders." Since the people the educator wants to influence will often follow the example of such informal community leaders, this can be a very productive target audience.

The General Public. This group (along with schoolchildren) is most often the target of environmental education programs. Unfortunately, this is often because of convenience, not potential significance to environmental problems. Every community has a "general public" and the mass media methods most often used in communicating with it are usually readily available. Moreover, a mass approach often does not require the detailed community knowledge that a more narrowly targeted program demands and can seem easier to implement. Such "short-cut" approaches, however, usually fail to adequately address environmental problems.

This is not to suggest that the general public cannot help bring about improved resource management. On the contrary, a public appeal can be extremely effective, especially in creating receptivity for more detailed follow-up environmental education programs. But the development worker should be careful not to overlook an approach to more appropriate groups that could produce faster and more effective results. The development worker should have a specific reason for directing a program at a general public instead of another group. Exactly how the general public can help to solve an environmental problem should be clearly stated in the objectives of the program.

Schoolchildren. Conservation educators often address this group hoping to create environmentally knowledgeable adults. This is always a desirable goal, but may not always be the conservation educator's first priority. Serious environmental problems may require immediate attention, and school children may not be able to contribute to such an effort. Nonetheless, schoolchildren can be an appropriate target group if some of the following conditions are met:

1) Are a significant number of schoolchildren likely, some day, to play a role in managing the environment? Will they be future farmers, government decision-makers, or members of an influential general public?

   In many rural areas, conservation education can be justified because so many of the children drop out of school early to work on family farms. For this reason, the development worker should consider designing rural school-based education programs that have objectives similar to those of adult education programs in the same area. For example, teaching basic soil conservation and reforestation techniques to rural school children can be appropriate.

2) Can teaching schoolchildren effectively reach community adults?

   A school conservation education program can involve parents through school field trips and tree planting, litter clean-up, and other community campaigns. In effect, school conservation education programs can supplement adult extension services.

3) Can schoolchildren significantly affect present environmental problems; e.g. can the children plant windbreaks or fuelwood plantations?

4) Are all other necessary environmental education efforts already being carried out, so that only long-range attitude development needs attention? (This would be unlikely in most developing countries.)

5) Has the host country itself requested that conservation education be incorporated into the school program?

After identifying the audiences most capable of contributing to environmental management, the development worker must determine which of these possible groups can perceive the actions advocated by the program to be in their best interests. Education changes people's behavior through logic and common sense. Its use is based on the assumption that people will do what they think will most benefit them. People cannot be expected to change behavior they think best addresses their needs. (These needs can be as basic as a place to live, a job, and enough to eat; or as intangible as social status and ego satisfaction.) When people must be convinced to do something which may not be in their best interests, education is not the tool to use. Law enforcement, financial compensation, social pressure, or propaganda, for example, must be used instead.

In Somalia, for example, people living in the Luug refugee camp in January 1984, had cut so much firewood that the land around the camp had become a baking and barren desert. Women had to walk long distances to gather the wood they needed. Relief workers and the Somali forestry department were working with the refugees to reforest the area, yet the refugees had to be paid to plant trees. Why? Because the refugees had no idea where they would be in five years when the trees would be ready for harvesting. Here, then, payment, not education, was the way to motivate people.

Often, the people closest to an environmental problem are least able to alter their actions. Take, for example, farmers who are overharvesting wildlife and trees in a natural forest. To convince the farmers to do otherwise, an environmental education effort has to advocate practical alternatives that can meet their need for animal products and wood. Without alternatives, the effort will not be able to convince the farmers to change, even if their actions are detrimental to the natural resources and the community.

Another way to change the farmers' behavior may be to direct an educational effort at people who can motivate the farmers to change, and has it in their best interest to do so. For instance, the educational program may be directed at community leaders who can provide the farmers with financial incentives to plant trees, or at neighbors being harmed by the farmers' behavior who can pressure leaders to provide farmers with alternatives.

Thus conservation education programs can sometimes more effectively affect people's behavior when focused indirectly at them. For this reason, conservation educators should not assume that the people whose behavior ultimately needs to change are the best or only target audience for their educational efforts.

Fundacion Natura, a non-governmental environmental organization in Ecuador, has developed one of the largest and most effective environmental education programs in Latin America. In large measure, it has been successful because it has focused its efforts on priority environmental problems and it has carefully selected those target groups most capable of solving them. Thus, although many of Ecuador's environmental problems revolve around people living in rural areas, Natura has directed considerable effort toward reaching government decision-makers because Natura has concluded that government support and participation are critical for successful environmental management programs.

To this end, Natura has developed slide programs to show to small groups of government officials in various ministries. Slide shows have been followed by questions and discussions and accompanied by a Natura-prepared environmental booklet. Also, in part to further motivate government to take action, Natura has communicated with the government's constituents, the general public, with television and radio programs describing Ecuador's environmental problems and their solutions. In this way, Natura has successfully encouraged a public mandate for sound environmental treatment.

SUMMARY

Conservation education has an environmental impact by changing people's behavior. However, in every environmental situation, some people have a greater impact on the environment through their actions, and are more likely to be influenced by an education program than others. The conservation educator can waste a good deal of effort trying to educate inappropriate audiences. They may learn enthusiastically, but the environment may not benefit from their new knowledge and attitudes. Thus it is crucial to choose the proper target audiences for effective conservation education programs.

The following questions should be of help in selecting audiences:

- ° WHO IS DIRECTLY AFFECTING THE NATURAL RESOURCES UNDER CONSIDERATION?

- ° IS IT IN THEIR INTEREST TO CHANGE THEIR BEHAVIOR?

- ° WHAT WILL CHANGE THEIR BEHAVIOR? (e.g. law enforcement, education, government policy, social pressure, financial incentives)

- ° WHO WILL BENEFIT FROM THE IMPLEMENTATION OF THE MEASURES ADVOCATED BY THE EDUCATIONAL PROGRAM? Can they play a role in getting the measures implemented?

- ° ARE THERE INFLUENTIAL COMMUNITY MEMBERS WHO CAN HELP CONVINCE PEOPLE TO CHANGE THEIR BEHAVIOR? WHO?

- ° ARE THERE INFLUENTIAL COMMUNITY MEMBERS WHO CAN PROVIDE INCENTIVES FOR PEOPLE TO CHANGE THEIR BEHAVIOR? (e.g. financial inducements, law enforcement, social pressure, government policy)

- DOES THE ENVIRONMENTAL SOLUTION REQUIRE GOVERNMENT INPUT? (e.g. laws, policy, leadership, law enforcement, funding, support for new programs)

- WHICH GOVERNMENT AGENCIES CAN CONTRIBUTE TO SOLVING THE PROBLEMS? How?

- WHAT DO THE IDENTIFIED TARGET AUDIENCES NEED TO KNOW IN ORDER TO CHANGE THEIR BEHAVIOR? See Chapter 5.

5

Identifying the Message

INTRODUCTION

Knowing what environmental issues merit attention, whether viable technical solutions exist, and which people are most capable of helping to implement these solutions, the development worker can determine the information to be communicated in a conservation education program. As each environmental situation is different, the content of every conservation education program is different as well. This chapter can assist in identifying and organizing the types of information most appropriate for each particular situation. Specific information that can form the actual content of the lessons can then be assembled from other technical manuals and locally available sources.

Careful selection and organization of a conservation education program's content is crucial for its success. This task can be challenging since there is often abundant information that can be presented. It is easy to be led off on tangents by information that is interesting or that somehow pertains to the environment. The conservation educator must be selective, choosing only the information that will bring about desired changes in environmental behavior, ruthlessly editing out the rest.

The educator needs to develop lean and direct educational efforts that confront environmental problems head-on, unencumbered by excess informational baggage. The guidelines below may help in developing such efforts.

GUIDELINES

The first step in determining program substance is to learn why people are behaving in a way that needs changing. Where do target audiences lie on the following continuum? Are they:

1) Aware the environmental problem exists?
2) Aware of their relationship to the problem: how it affects them, and how they are contributing to it?
3) Aware of the problem and their relationship to it, but not aware of its solution?
4) Aware of the problem, solution, and what they should do, but not convinced that changing their behavior will benefit them? Not motivated to change their behavior.

Depending on the audience, it may not be necessary to begin the education program at Step 1. Wherever the educator begins, however, it will be necessary to move the audience along the rest of the continuum through Step 4 to obtain positive results. Encouraging people to adopt an environmental solution will be futile if people are not convinced that a problem exists and that it affects them. Likewise, if people do not understand their relationship to the problem, they may easily implement inappropriate solutions.

For audiences at Step #1, the education program's message should be straightforward, simple, yet informative. Detail should be minimal, concentrating more on catching people's attention. Accuracy, however, is crucial and should never be sacrificed to appeal to public opinion. Emotionalizing information is appealing in many countries, but the effort can backfire if the information is perceived as being inaccurate or sensationalized.

For those groups at Step 2, a more substantive message is needed. Here, people's general awareness of an issue should be developed into an understanding of how they are affected by and are affecting the environmental situation. The environmental problem should always be related to the audience's particular interests. For example, firewood shortages and flooding of residential areas might be presented to villagers as the consequences of the deforestation of a watershed, since those consequences affect them directly. The disappearance of rare bird species and the loss of scenic beauty that are also the result of deforestation will be of less concern to this audience. Here knowledge of the community can become critical. Problems must be brought home to have an impact.

Step 3 is a turning point for the conservation educator and is where many programs fall short of their intended goal. People must clearly understand what they should do to help solve an environmental problem. It is counterproductive to generate in people a concern about an environmental problem and then abandon them. They can become frustrated and apathetic and may even refuse to participate in later (and perhaps more constructive) attempts to address the same issue. Environmental solutions can be as simple as requesting children not to throw candy wrappers on the ground, or as major as recommending that farmers change their planting and plowing methods. Whatever the solution, the education program must identify it and present it in a way that relates to the audience's interest.

If the audiences targeted for a conservation education program fall at Step 4, further investigation may be required. There are many reasons why people do not do something that appears to the outsider to be clearly in their best interest. It may simply be a matter of not perceiving the proposed action as beneficial, but may easily be more complicated. Their reluctance may be due to religious taboos, traditional customs, political discord, or distrust of a foreigner. Perhaps the leaders, official or otherwise, selected to serve as role models in the program are, in fact, not trusted by the people. One very likely possibility is that the solution being advocated was developed without sufficient local participation. The solution may have some serious flaws clearly perceived by the community but not by the "experts" who developed it. If there appears to be no "logical" explanation for people's negative reactions, the process and assumptions which led to the selection of that particular solution should be reviewed. Take time to go back to determine where something may have been missed or misinterpreted.

Bill Weber and Amy Vedder, Peace Corps Volunteers in Zaire from 1973 to 1975, received a research grant from the New York Zoological Society in 1977 to conduct a comprehensive study of problems related to the conservation of the mountain gorilla and its forest habitat in Rwanda's Volcanoes National Park. Within the park, their work included an initial census of gorilla numbers, as well as a study by Amy of gorilla ranging and feeding ecology. Beyond the park's boundaries, however, Bill focused his attention on social and economic factors which could affect conservation efforts.

Before developing the content of the environmental education program, he focused on his audience. He began by becoming familiar with the knowledge and attitudes of the people living in the park's vicinity. To do this, he hired

Rwandans who were either students at the national university or local teachers, because he quickly discovered that his presence at interviews would produce inaccurate responses. The Rwandans would immediately guess what his attitudes were and would tend to match their answers to fit them. This is a common problem in interviewing situations worldwide; thus the development educator should take special care to select an approach that is the least threatening in his particular setting.

The results from the survey clearly showed that people saw no value of the forest or its wildlife beyond harvesting the trees or animals. Answers to questions such as "If you cannot cut the trees, does the forest have any other value? If you cannot hunt the animals, does the forest have any other value?" indicated a widespread failure to recognize non-consumptive values. In fact, the forest's presence ensured a reliable supply of clean water, and the gorillas helped the region financially by attracting foreign tourists. Having determined what people did not know but needed to know in order to change their behavior, Bill and Amy set out to change the situation, employing a variety of techniques, including town meetings, school programs, and slide shows. By 1984, a survey showed that now fully 80% of the people in the region could cite non-consumptive reasons to protect the forest and its wildlife, versus only 35% four years earlier. (Weber, personal communication)

SELECTING THE PROGRAM'S CONTENT

After identifying what the target audiences need -- general awareness, practical guidance, motivation, or a combination of all three -- the following process, based on Posner's and Rudnisky's guide to curriculum development for teachers (1978), can be used to help ensure that the program's content is relevant to the environmental problems at hand.

° **Write a problem statement that describes the environmental issue to be addressed by conservation education.**

The first step is to have a clear and concise statement of the environmental problem the program is intending to address. The issue can be as broad as the absence of a public conservation ethic or as specific as eroded hillsides that require reforestation. The diagnoses carried out in Chapter 2 should provide the basis for writing this statement.

Problem Statement Example: People in the village are cutting down trees in the vicinity faster than they can grow back; extensive deforestation has resulted. The consequences have been a growing fuelwood shortage, which has caused a great deal of hardship. Women and children who collect the wood must now devote practically an entire day to collecting a load of wood. In the process, they often enter government-protected forest lands to illegally cut trees. This deforestation has also wreaked havoc on the environment; with the woody vegetation gone, the soil is blowing away and the wildlife has disappeared.

° **Prepare a rationale or a justification for the proposed conservation education program.**

The rationale explains why a conservation education effort should be applied to the environmental problem described in the problem statement. It has two purposes: A) to justify expending time and resources on a conservation education program, and B) to serve as a reference point for developing the program's specific objectives. The rationale should specify both the solutions to the environmental problem and how educating people to be targeted by the education program will help to implement these solutions. The more carefully a rationale is thought through and developed, the easier it will be to identify the information to be taught.

Rationale Example: The solution to the deforestation lies not in restricting fuelwood harvest, because people need the wood, but in a) establishing fuelwood plantations and b) developing energy conservation techniques. The town leaders, more than anyone, must understand the importance of planting trees and be motivated to do so, because they can organize and inspire the community effort needed to get the job done. Thus an education program directed at them can significantly contribute to solving the deforestation problem.

° **State the program's goal.**

The rationale explains why a conservation education program is needed; the goal statement explains what the program intends to accomplish. This statement should come from the analysis of where the target groups fall in the continuum presented above. It should clearly describe the overall desired outcome of the conservation education effort, without being so general that it could pertain to any conservation education program.

Goal Statement Example: To illustrate to the town leaders how to establish village woodlots and employ effective energy conservation measures and to motivate them to do so.

4) Develop the program's intended learning outcomes.

The program's intended learning outcomes (ILO's) are what people need to learn so that the program's goals will be realized. They can be "facts, statements, ideas, principles, capabilities, skills, techniques, values, or feelings" (Posner, 1978, p. 16). ILO's can be as concrete as knowing how to put a tree in the ground, how to clean insecticide application equipment, and how to plow on the contour; or as intangible as appreciating the value of a natural reserve or wanting to protect a sea turtle nesting beach.

To determine a program's ILO's, simply ask: what do people have to understand and believe in order to change their environmental behavior? In the beginning, to organize thoughts, it may help to simply jot down a list of all possible subjects as they randomly occur. Then go over the list and ask what will produce the desired behavior results, and what will distract from the purpose at hand.

For example, if the goal is to encourage town leaders to initiate community woodlots, a beginning list may look like this:

The town leaders should:

1) Know there is a fuelwood shortage.
2) Know how to water the trees and keep livestock from grazing in the woodlots.
3) Know the carbon and water cycles.
4) Know that deforestation can cause soil erosion.
5) Know that soil erosion can cause reduced crop yields.
6) Want to plant woodlots and use more efficient woodstoves.
7) Know where to get seedlings and woodstoves.
8) Know how to organize the community.
9) Know there is a worldwide fuelwood shortage.

10) Know that the trees can serve as nesting sites for various songbirds.

11) Know how trees are pollinated.

12) Know which trees can most benefit the town.

13) Know that fast-growing trees can provide fuelwood in five years.

14) Understand that plants use sunlight through photosynthesis to produce energy.

15) Know how to operate a woodstove.

16) Know how to identify 20 native tree species and know something of their natural history.

17) Know that the villagers must have some incentive to maintain the woodlots.

This list could then be refined and edited. Numbers 1 and 8 in this hypothetical example could perhaps be eliminated because, let's say, the town leaders already know this information. Meanwhile, numbers 3, 9, 10, 11, 14, and 16 could be rejected because they would be tangential to solving the environmental problem and solution being considered. The remaining possibilities could then be organized so they follow a progression that appears logical to the educator:

The town leaders should:

1) Understand that deforestation can cause soil erosion.

2) Understand that soil erosion can cause reduced crop yields.

3) Recognize that planting trees can reduce soil erosion.

4) Know that fast-growing trees can provide fuelwood in five years.

5) Know which tree species can most benefit the town.

6) Know what is needed to maintain and protect the trees and who is best suited to do this.

7) Understand that improved woodstoves can reduce fuelwood use and thus conserve wood.

8) Know what is involved in operating woodstoves.

9) Know where to get tree seedlings and woodstoves.

10) Want to plant woodlots and use more efficient woodstoves.

11) Identify the factors which will motivate the villagers to maintain the woodlots.

Using this process the educator converts environmental and social knowledge of a community into an educational strategy. By stating what needs to be done and why, and listing what is to be taught, the program can fit the environmental problems at hand, not the educators' own interests and biases. The ILOs provide a framework that keeps the program on track. The level of detail and sophistication of the material to be communicated to achieve the ILOs will depend on the age and background of the target audience. A certain amount of creativity and selection is involved. Just telling people the concepts illustrating the ILOs will not capture their interest.

SOME BASIC EDUCATIONAL PRINCIPLES TO KEEP IN MIND

People generally try to incorporate new information into already-held beliefs and knowledge.

To accept unfamiliar ideas and knowledge, people need to adjust attitudes and beliefs. For most individuals this is very difficult. In fact, since change can easily cause stress and confusion, most people resist altering entrenched beliefs.

For this reason, the probability that a conservation education program will ultimately be successful in changing attitudes and behavior will be directly related to the ease with which the program's message can be accommodated by previously-held attitudes. This means that it is critical for the conservation educator to know the significant beliefs of the people to be educated. The educator who has taken the time to understand the community will be implementing programs with a crucial advantage.

An educator will be far more likely to inspire behavioral change if the education program is related to existing concerns and presented in terms familiar to the audience.

It is far easier to get people to do something if they feel it will address an existing concern than it is to develop a new concern from scratch and then convince people to adopt a certain behavior to address it. (Nonetheless, developing an awareness for an environmental problem is often a necessary first step). For example, if fuelwood shortages and flooding of residential areas are already of concern to villagers, that concern can be the basis of a program of action to address the deforestation of the watershed that is the underlying cause of those problems. Similarly if local fishermen are concerned over the loss of a commercial fish species that may result from the destruction of a mangrove swamp, they can be motivated to take action to preserve the swamp.

In Haiti, intensive efforts to motivate farmers to plant trees on badly-eroded hillsides had largely failed. Anthropologist Gerald Murray discovered that this was because the efforts had failed to relate the tree-planting to the farmers' primary concern: maximizing profits. Farmers had been paid to plant seedlings, but not to take care of them, and the seedlings had not taken hold. Murray recommended that project personnel simply make it clear to the farmers that planted trees could be a profitable cash crop.

The Haiti Agroforestry Outreach Project, funded by USAID and administered by the Pan American Development Foundation, CARE, and Operation Double Harvest, put Murray's suggestions to work. The result: from 1981 to September 1984, more than 21,000 small landholders were caring for trees planted on their farms. (Conway, 1984)

Of course, people's concerns are not always economic and the educator should be alert to other interests. The desire for status and respect, for example, can be a powerful motivator. The authors have found that national pride is often a useful attitude upon which to base behavioral change. Thus we have seen, on several occasions, people with no real interest in nature or outdoor activity become motivated to preserve natural areas because these areas represent a unique and valuable national heritage that can be admired by both nationals and foreigners.

People, when learning new information, look for patterns, generalities, relationships, and organized structured wholes, rather than separate details.

People try to fit facts into contexts so they make sense and can be remembered. They do not learn and form attitudes solely by retaining isolated facts. As anyone who has crammed for an exam knows, rote memorization only works in the short term. (Novak, 1977)

Thus broad concepts should first be presented to learners so they have a framework in which to incorporate further information. Details get lost over time when not linked to general themes. For example, using the case of deforestation, town leaders are unlikely to benefit from an environmental education program that starts off presenting the structure and functions of the parts of a tree. One could say that this is useful information that could enable the leaders to better care for tree plantations, but the leaders will most likely have forgotten this information by the time they finally understand the need for such woodlots.

A better approach would be to begin with a general concept of reforestation - what it is and why it should be of concern to the leaders. This broad concept, once understood, would allow the leaders to incorporate more specific information about the species and growth patterns meaningfully. A program should be structured so that the learners move from more general to more specific information, from the "big picture" to the smaller details.

SUMMARY

The conservation education program is now beginning to take on substance. At this point, the conservation educator can decide what a program's content will include and exclude, based on her earlier investigations. The planning process involves writing a problem statement, a rationale, a goal statement, and a list of intended learning outcomes. Carefully done, this effort can keep a conservation education program focused on the environmental problem at hand and prevent the educator from becoming distracted by peripheral issues and irrelevant information.

The following questions are provided to assist the reader in making sure he or she has followed the process:

- WHAT ENVIRONMENTAL PROBLEM WILL THE CONSERVATION EDUCATION PROGRAM BE ADDRESSING?

- WHY SHOULD THE PROGRAM BE DIRECTED AT THIS ENVIRONMENTAL PROBLEM, INSTEAD OF OTHERS?

- HOW CAN THE CONSERVATION EDUCATION PROGRAM LEAD TO A SOLUTION OF THE ENVIRONMENTAL PROBLEM?

- WHAT ARE THE INTENDED TARGET AUDIENCES FOR THE EDUCATION PROGRAM? WHY SHOULD THEY RECEIVE THE PROGRAM'S ATTENTION AT THE EXPENSE OF OTHER POSSIBLE GROUPS?

- WHAT KNOWLEDGE AND ATTITUDES MUST THE TARGET GROUPS HAVE IN ORDER TO BE ABLE TO EFFECTIVELY CONTRIBUTE TO SOLVING THE ENVIRONMENTAL PROBLEM? DO THE PROGRAM'S ILO's INCLUDE THIS INFORMATION?

- WHAT INFORMATION HAS BEEN GATHERED ABOUT THE AUDIENCES' BELIEFS, CUSTOMS, LEVEL OF EDUCATION?

- HOW SHOULD THE INFORMATION BE COMMUNICATED? See Chapter 6.

6

Selecting an Educational Strategy

INTRODUCTION

Many educational strategies can be used in conservation education, ranging from producing posters to developing national forestry extension programs. Like every other facet of conservation education, strategies must fit existing environmental, political, and social situations if they are to be fully effective.

Conservation education strategies widely used in the United States may be totally inappropriate in developing countries, for a variety of reasons. Unfortunately, however, U.S. conservation educators working in developing countries commonly select education strategies because they are familiar, not because they are the most effective strategies available. Thus educators who have worked as interpretive naturalists will set up nature centers and conduct teacher workshops, without considering whether working with farmers or government leaders would have a greater environmental impact.

Development workers involved in conservation education are more likely to have positive environmental impact if they carefully consider all the possible strategies available to them before implementing any. They need not feel tightly constrained by prior experience with a particular approach; one of the best features of development work is that it offers willing and adaptable people opportunities to work effectively in areas new to them.

Lou Ann Dietz, an education specialist and former Peace Corps Volunteer from Brazil, has implemented several successful education strategies as part of the U.S. National Zoo's Golden Lion Tamarin Project in Poco das Antas Biological Preserve in Brazil. The golden lion tamarin is a small monkey that is now facing extinction in its south-eastern Brazilian range. In response, the National Zoo is transplanting zoo-reared animals into the reserve. Lou Ann's husband, Jim, is the on-site biologist in charge of the project; Lou Ann's job is to educate local people about the value of the monkey and the reserve, so that both will be secure, to the benefit of both monkey and human.

To begin the effort, Lou Ann worked closely with Brazilians to identify different target audiences and to learn their environmental attitudes. She found, as did Bill Weber in Rwanda (see page 57), that a survey of attitudes carried out by local teachers provided critical information to guide the program's content and methods. The information she gathered along with her understanding of the people's customs and concerns led her to select a combination of strategies for the conservation education program. In an article published in the National Zoo's magazine Zoogoer (Dietz, 1985) Lou Ann writes:

> Our activities have ranged from organizing press events inside the Reserve to producing for schoolchildren free notebooks with a tamarin cover and conservation message. We have aired public service messages on radio and TV, trained teachers in ecology, taught landowners how they can save on property tax by establishing private forest refuges, and lectured local officials, schools, conservationists, farmers, university students, and scientific congresses. We have developed posters, audio-visual programs, leaflets, stickers, buttons, t-shirts, and decals. Approximately 4,700 people have passed through our travelling exhibit and hundreds have seen our production of a children's play about tamarin conservation.
>
> Six schools have organized field trips to the Reserve, where the reintroduced animals--already accustomed to people--have been a special source of delight to the youngsters. During one visit, a daring young tamarin came down from a tree, found a tree frog, and ate it in front of 25 ecstatic high school students.

> Although public enthusiasm is growing, we know the changing of attitudes and behaviors is a slow process that will have to continue long after most of us have returned to the United States. Fortunately, an energetic Brazilian biologist, Elizabeth Nagagata, is one project member who plans to stay. She will continue the educational work she has helped begin--keeping public enthusiasm alive and continuing to supply scientific information so that conservation of the forest and all its elements--including the golden lion tamarin--will come to be regarded not just as something in vogue, but as a crucial issue meriting continuing action.

This chapter discusses some guidelines for choosing a strategy or several and briefly describes several commonly-employed strategies. The strategies described here are certainly not the only choices available. Many different educational approaches have been used in various situations around the world; it is also quite possible that a development worker could develop an entirely new and appropriate strategy that has not yet been applied to conservation education. Sometimes, as Lou Ann Dietz's and Bill Weber's programs illustrate, the best strategy is a combination of several coordinated together. The strategy, after all, should fit the situation, and the conservation educator could easily have to address a situation with a unique combination of environmental and social characteristics. Regardless of the situation, however, the development worker will best approach the problem with an open mind, without preconceptions.

GUIDELINES

A conservation education strategy should do two things: (1) reach the program's target audiences and (2) effectively communicate the program's information. There are several factors the educator will want to consider about the target audience and the educational program's message when selecting an appropriate conservation education strategy:

- How do the target audiences receive information? Do they listen to the radio or television, read a certain newspaper or magazine; watch for bulletins posted in the town square; communicate with friends at the central market? Do they listen to the local extension agent, the religious leaders, or the local political leader at party meetings? Who are considered reliable community leaders, role models, and conveyors of information? Can any existing communication mechanisms be used in a conservation education program? (The conservation educator can, of course, come up with new methods of communication.)

- How literate is the audience? Can the people read or write? Are they "visually literate" - that is, do they have experience in interpreting two-dimensional drawings and photographs?

- How much information does the audience need to know to change its environmental behavior? Is the message to be communicated short and simple, or long and complicated? Will it have to be repeated periodically or will one presentation suffice? Will the education program be long or short term?

Certain practical factors are important, as well:

- Who is available to carry out the educational program? How much time can they devote to the program? How much training, supervision and direction do they need?

- How much time does the development worker have to devote to the program? For the program to succeed in the long run, what must be done before the development worker leaves?

- How much money, equipment, and other resources are likely to be available? Are there any potential outside agencies able to provide these resources?

Depending on the answers to these questions, an education strategy can be chosen which fits both the audience and the program content. A number of strategy options are described below.

SERVICIO
EXTENSION
AGRICOLA

Extension Programs

Extension programs are designed to teach adults specific methods for improving their standard of living. Typically extension programs treat health, home economics, agriculture, and forestry topics; extension workers carry their messages to individual homes or to local organizations made up of people with similar interests, such as homemakers, mothers with young children, or farmers. In relaying their messages, extension workers can employ a broad range of communication techniques and strategies, including those listed below.

Extension programs are the only mechanism available in many developing communities for effectively presenting substantial amounts of environmental information to adults with the intention of changing their behavior. To show a farmer how to plow on the contour, plant fast-growing trees, or apply a less harmful insecticide on his land, a conservation educator will almost always have to work individually with the farmer, most likely in the farmer's field and usually more than once. The only educator available in most countries to do this work is the extension agent.

Elmo Drilling, a former Peace Corps volunteer in the Philippines tells of an effective use of extension agents. Farmers were being paid to plant trees to compensate them for giving up land they would have used for agriculture. They were thus encouraged to take seedlings, but there was no guarantee they would plant them. The program had no education component, and the farmers had no motivation to care for the trees. Fortunately, this was recognized early, and the Philippine government hired extension agents to visit the farms and educate them about the planting and care of the trees. The money spent subsidizing the tree planting would likely have been wasted were it not for the extension agents. (Walton, 1982)

Audience: Individual adults or groups of adults with common interests.

When Appropriate: When large quantities of information need to be adapted to specific situations and when this information can best be demonstrated through personal contact with target groups. A farmer may understand the techniques of contour plowing but he will probably need someone to demonstrate how to use them on his land before he feels comfortable in applying them himself.

Strengths: Extension programs are generally the most effective means of communicating large amounts of environmental management information to adults. While other educational approaches can increase people's awareness in environmental issues, extension programs are often needed to build on such awareness before people's behavior ultimately changes. For instance, mass media can communicate such topics as soil conservation, forest and wildlife management, and insecticide use to farmers, but someone will probably still have to come out to the farmers' homes and demonstrate how to apply this information.

Well-trained and motivated extension agents understand the people with whom they work. They know both the technical subject matter and how to present it, as well as how to develop an understanding of their communities. Thus they can tailor their efforts to fit their audiences. Extension workers can also spend considerable time with each person they are educating.

Weaknesses: Because one extension agent reaches relatively few individuals and typically spends a good deal of time with each of his "clients," extension programs are comparatively expensive. In developing countries, agents are often poorly-trained and may be poorly-paid and poorly-motivated as well. What is more, extension services are frequently seriously understaffed, and many are unable to provide the personnel they do have with adequate transportation, teaching aids, and on-the-job technical training. All of this can be crucial, because an extension program's success depends on the extension workers' commitment, skill, and ability to get to the people they are expected to serve. Often extension workers receive their training in the capital city and acquire information that is not useful to rural communities.

Implications for Implementation: The support of officials at all appropriate levels of the extension organization - national, regional or local - is needed before extension programs can be used to communicate environmental messages. Sometimes, extension programs do not exist, so a great deal of time working with appropriate government officials will be required before such an effort can begin. Where this support exists, conservation educators may become involved in several ways to help extension programs become effective in encouraging sound natural resource management. Some possibilities:

- Training extension agents by organizing, presenting, or finding financing for workshops, or by writing training materials.
- Preparing teaching aids for the extension agents to use: slides, displays, coloring books, posters, etc.
- Helping extension agent counterparts with the technical or educational aspects of their work.
- Helping extension agents coordinate their efforts with other entities, e.g. with schools, private conservation organizations, and mass media.

The Peace Corps ICE manual Agricultural Extension provides extensive and valuable advice for development workers involved in extension programs.

School Programs

Important environmental concepts and practices can be communicated in school classrooms through formal programs of study. This information can be presented either through a curriculum as distinct as math or history, or it can be integrated with other study programs, such as within science or social studies. Most frequently, conservation education programs have to fit into other study programs, because schools infrequently have either the mandate to develop conservation education curricula or the additional time in the school day to add new areas of study.

Conservation education programs in the United States usually teach students basic ecological principles and how humans affect and are affected by their environment. They also usually try to encourage students to appreciate the natural world. Some, in addition, discuss current environmental problems and how students can contribute to their resolution.

For several reasons, however, the U.S. approach - a heavy emphasis on ecology and nature appreciation - is often not practical in developing countries:

° It can be very difficult to train and motivate teachers to carry out such programs. Teachers in developing countries, particularly in rural areas, may be poorly trained, poorly-paid and poorly-motivated. Often, they will have progressed no further than junior high school themselves. A curriculum that includes extensive natural science material may simply be too much for them to handle.

- There is usually insufficient time to lay extensive foundations of ecology and science. School days in developing countries are often three-four hours long or less. What is more, children, again particularly in rural areas, often end their schooling after a few years to work on family farms.

- The environmental problems of developing countries are often so severe, yet their solutions so basic that it is best to present this information straightforwardly in school, without trying to make students junior ecologists or naturalists first. Furthermore, extension services in developing countries are usually not large enough to reach more than a few of the people that could benefit from them. Schools, therefore, may very likely be the last place where people can learn important environmental management concepts and techniques. Given limited time, should rural school students learn about food chains and what is "biotic" and "abiotic", instead of learning how to combat soil erosion and how to plant trees? Which approach will have a greater environmental impact?

- Some U.S. conservation education curricula encourage students to analyze environmental issues and make up their own minds about which side they support. This approach differs significantly from the "rote memorization" approach to teaching that is the norm in many developing countries. In many cases, it is not realistic to expect students and teachers to adapt to a different way of learning at the same time they are learning a new conservation subject.

In most developing countries, the best way to use schools as vehicles for improving environmental management, particularly in rural areas, is to teach students sound environmental practices that solve relevant environmental problems and how such practices can benefit them. Generally, such curricula should address the following issues:

- The natural resources that are important to the students and why.

- How these resources can be damaged by humans.

- How damaging these resources affects the students' welfare.

- How these resources should be managed.

- How to use specific environmental management techniques: e.g. planting trees, stabilizing gullies in fields, picking up litter, etc.

Schools also provide an infrastructure through which conservation education can be presented to adults. Not only can students share information learned at school with their families but also the community can be drawn into the programs' environmental activities. Various school activities can involve the entire community, like tree-planting and litter clean-up campaigns and demonstrations or exhibits on deforestation, pollution, soil management, and wildlife.

Furthermore, local professionals, such as extension agents, foresters, national park guards, health officers, and others can be invited to schools to participate in conservation education programs. This gives them, and the message they are trying to communicate a higher community profile. In this way, schools can serve as effective supplements to adult extension programs.

Audience: Children of all ages, and of both rural and urban backgrounds. Indirectly, the families of the children and other community adults.

When Appropriate: When students can apply conservation education material immediately, e.g. when they can plant trees on family farms or start community litter campaigns. When the goal is to train tomorrow's adults to be able to make wise environmental decisions. When the material to be taught is simple enough to be taught by teachers untrained in environmental management and easily understood by students. When school activities can constructively involve the rest of the community.

Strengths: School programs can reach a large number of students and cover detailed substantive material. Because the audience is likely to participate in a school program over many years, difficult and complicated concepts can be gradually and meaningfully presented. A conservation ethic can be instilled while students are still forming attitudes and values. Schools can also be used to educate adults, as described above.

Weaknesses: A significant gap may exist between the time when students learn something and the time when they have a chance to apply it. During this time, students can forget much of the information taught in a conservation education program. Thus a school program may be effective only when combined with an adult extension program that builds on what the schools have taught. Because of this gap, school programs may not be as appropriate for confronting present environmental problems as programs directed at adults.

Some school study programs are so structured that there is no flexibility for adding new material. School policy may be to teach students the basics in reading, math, history, and science, and no room may exist for topics such as tree-planting and soil conservation.

School programs can require a great deal of time and effort to prepare. Existing curricula must be reviewed, new curricula must be developed, financed, and approved; materials must be printed, and teachers must be trained in their use. It can be very difficult to convince poorly supported rural teachers to do additional work without some sort of compensation.

Implications for Implementation

There are several steps in introducing a conservation education program in the schools:

° Analyze the existing curriculum. Determine if the country's curriculum has a conservation education program of study. If so, does the program address the country's environmental problems, or does it merely teach ecology or natural history without relating these to environmental management? If not, can such a program be developed as a separate entity, or can it be incorporated into existing programs?

° Obtain Ministry of Education support for developing a curriculum. Even if Ministry officials are not directly involved, keep them informed of the program's progress. Ultimately, they will be the deciding factor for institutionalizing the curriculum on the national level.

° Develop a curriculum with a counterpart or counterparts. The counterpart will be able to help make the curriculum appropriate to the culture and the school system. Trained counterparts can also continue refining the curriculum, training teachers to use it, and producing additional study material after the development worker has left. Where conservation education is being introduced to a school system for the first time, it is critical that teachers be involved in the design of the curriculum itself. Because they are not likely to have environmental training it will take longer, but there will be a much higher probability that the teachers will implement the curriculum. Furthermore, they will become environmentally conscious through the process of developing the curriculum. We have seen very few successful school programs when the outsider designed the curriculum himself or borrowed a model from a developed country.

- Pilot test in schools. This will reveal several features about the curriculum.
    - Can it be understood and used by the teachers?
    - Can it be understood and enjoyed by the students?
    - Are the materials required by the curriculum's activities available in the school communities? In many schools, chalk and a chalkboard are the only teaching materials available. The existence of such common items as cellophane tape, crayons, scissors, construction paper, clay, and feltboards should not be assumed. Do not, however, underestimate human ingenuity. Many of the functions of these items can be fulfilled by using local materials.
- Evaluate and revise the curriculum.
- Train other teachers to use the curriculum. Attention to this phase is critical. A conservation education curriculum will do little good if it is only used effectively in the communities where it was pilot-tested.
- Print and distribute the curriculum. In countries where textbooks are scarce, every effort should be made to use cheap materials like newsprint or mimeograph paper. Curriculum guides need not be bulky, lengthy documents.

It is tempting to use existing curricula from other countries, adapting them by changing the place names and the plants and animals cited. This, however, is only a short term solution. For one thing, the concepts and approaches in curricula from developed countries are usually not relevant in developing situations. But also, presenting teachers with an existing program deprives them of the chance to review and organize relevant information to meet their community's needs. The process of designing a curriculum from scratch is as important as its eventual implementation.

Clubs and Non-governmental Nonprofit Environmental Organizations

Various kinds of clubs, including nonprofit organizations, professional societies, and both adult and youth groups, can contribute to environmental management. Among other things, they can carry out such environmentally beneficial community projects as tree planting and litter campaigns, study environmental problems and recommend their solutions, lobby for environmentally responsible legislation and policy, educate the general public on environmental issues, and provide funding for natural resource management projects. Thus conservation education efforts can be productive when directed at making private groups interested and effective forces in environmental management.

A wide variety of clubs and organizations can be environmentally effective. Some can be formed solely to further conservation goals, such as natural history societies, outing clubs, conservation associations, and groups which provide volunteer assistance in managing underfunded national parks and reserves. Many become effective lobbying and advocacy organizations. Other organizations, such as the Lions Club, Rotary Club, and Chamber of Commerce, have become effectively involved in conservation even though they have other interests as well. Agriculture and rural development cooperatives are often sufficiently organized to implement environmental projects. Youth groups like Boy Scouts, Girl Scouts and 4-H clubs can carry out a broad range of conservation activities and educate both their own members and the general public. For example, the extraordinary African wildlife clubs of the Sudan, Uganda, Tanzania, Zambia, and Kenya feature an impressive array of creative educational activities for large numbers of young people.

Private organizations able to contribute to conservation range in size and scope from local community groups of only a few people to international organizations with large memberships. They can be sophisticated and well-organized associations, with by-laws, logos, and regular meeting schedules; or informal ad-hoc groups. Some have their own newsletters, sponsor special events, create arts and crafts, sponsor field trips, and develop community service projects.

Often such groups include influential people in their memberships. Experience has shown that non-governmental organizations can warrant the development worker's attention because they are generally the most effective change agents for improving the quality of life for poorer citizens.

Audience:

Organization memberships of all ages and with a broad range of interests, objectives, and capabilities.

When appropriate:

When a recognized need can be addressed by a particular group and when addressing the need is within an existing group's interests and resources or within the interests of enough people to organize a new organization. Involvement in environmental issues must be based on sound environmental management principles; groups that react emotionally to environmental issues out of ignorance are, in the long run, counterproductive.

Strengths:

Because of their diversity, private organizations can effectively contribute to conservation in a number of ways. People belong to such groups because they are committed to the organization's objectives and enjoy volunteering their time to carry out the activities. Thus if a conservation education program can help an organization meet its objectives, the conservation educator can count on committed memberships willing to work at carrying out effective projects. Frequently, such organizations have evolved as a result of a particular need recognized by a group of citizens. Motivation is generally high and the development worker can move right to the task of educating. Citizens' groups are often aware of social and cultural factors influencing environmental problems and are less likely to present inappropriate suggestions for change.

Youth conservation clubs can usually pass on more conservation information to their members than schools because they do not have the general education responsibilities that schools do. Consequently, they can be more flexible. Youth club leaders can also be very highly motivated and committed to club goals.

Weaknesses:

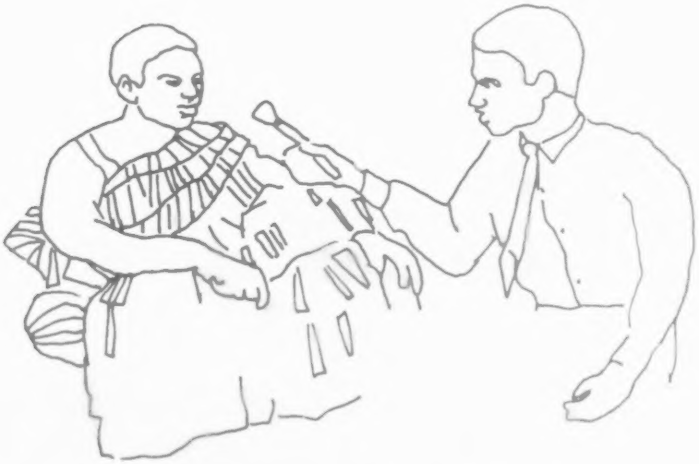
Money is very often in short supply, so a shortage of materials may exist. Without money, it is difficult to obtain an office, maintain paid staff, and establish credibility with a logo, address, telephone and stationery. While the volunteerism may be a strength, it can also cause certain problems. For example, long-term conservation programs that require continuity may suffer if members lose interest. Also, an effort must often be made to make conservation projects enjoyable, which can significantly compromise program goals. Finally, when environmental problems are controversial, conflict can result among members regarding which issues to address.

Implications for Implementation:

Working with well established groups requires a minimal commitment of resources. Members are already used to drawing on their own resources to support activities and can be quite resourceful in developing materials and raising funds for conservation efforts.

Starting new organizations is more costly in time and money. First, it must be clear to potential members that organizing themselves to become involved in conservation will be an enjoyable and a valid use of their time. Time must also be expended in developing infrastructures, policies and procedures before newly-formed clubs can get involved in conservation programs. Even so, organizing need not be expensive. Meeting places can be members' homes; materials can often be procured through donations. Volunteers, by nature, are resourceful if highly motivated.

New organizations are often started by one or two dynamic individuals who, over time, convince others to support the same cause. A development worker should be careful not to take on this role entirely alone, or the club may not survive for long after the worker leaves.



Mass Media - Television, Radio, Newspapers

In the United States, the mass media frequently treat environmental subjects in a superficial way, reporting only newsworthy events like nuclear plant accidents or the controversial policies of the Secretary of the Interior.

The mass media in developing countries act in the same way; covering newsworthy events like rallies, meetings, press conferences, and ceremonies. Usually, such coverage is only effective in increasing people's awareness, not in significantly expanding their environmental knowledge and changing their behavior.

But mass media in developing countries also become involved in in-depth education. This is because extension services and school educational materials are typically in short supply in developing countries, so mass media are relied upon to take up the slack at a minimum of expense. Also, many government T.V. systems are desperate for local programming that will allow them to show something better than "Leave it to Beaver" or "Kojak" reruns. Thus, the conservation educator in developing countries can often find a capable newspaper or radio or television station willing to collaborate on in-depth educational programs.

Both government and privately-owned mass media frequently present such programs. Many types of educational programs have been produced in mass media, including:

- Educational radio or newspaper series directed at rural populations, covering such topics as health and child care, literacy, home economics, and agricultural techniques. Some try to entertain their audiences in order to attract them, the education messages often being delivered through dramatization. These programs are often supplemented by extension workers who work with groups of listeners/readers to expand upon the material presented in the media.

- Weekly newspaper school supplements that feature activities teachers can use in school. This is a very effective way of providing information when a shortage of school materials exists.

- Weekly columns on environmental topics, such as a country's wildlife.

- Contests. In Paraguay, one newspaper printed daily a portion of a photo of a species of the country's wildlife. The portions were cut out and pasted into a booklet provided by the paper. The first person to complete the booklet won a prize, and all contestants were eligible for a drawing for other prizes. Each photograph was accompanied by text which described the animal and gave interesting natural history information. This way the newspaper sold copies and the readers learned about the wildlife in their country.

Mass media can also communicate environmental information in ways more familiar to the U.S. - coverage of environmental issues and events, editorial columns, advertisements, etc. Such treatment of environmental information is usually only effective in increasing people's awareness, not in presenting detailed information.

Radio is usually the most effective mass medium for presenting extensive information to rural people; many cannot afford television and many cannot read, but many poor families have radios. On the other hand, newspapers can display drawings and diagrams, while television programs, though they will reach fewer people and are expensive to produce, can be very effective in increasing environmental awareness, if not in presenting detailed information.

In selecting a mass media communication strategy, the following questions need to be answered:

- How detailed and complicated is the information to be presented? How often will it need to be repeated?
- Will extension agents be required in the villages to expand upon the message? If so, who is available and how much training do they need?
- What types of mass media reach the educational program's intended audiences? Which newspapers do they buy? Do they have access to radio or television?

Audience:

Mass media are appropriate for communicating with large numbers of people throughout a country or region. Audiences can either be undifferentiated - the general public - or specific, like farmers, homemakers, or schoolchildren.

When Appropriate:

Mass media are best at treating information in a general way and at increasing people's awareness. Special program and article series, however, can treat material in more depth. Truly involved and complicated material can be presented only when expanded upon by on-site personnel (extension agents). In effect, mass media supplement extension programs in such situations.

Strengths:

The use of mass media can reach large numbers of people less expensively than any other method. They are unexcelled in reporting current issues and events. Used creatively, mass media can effectively present information appropriate to a wide range of situations.

Weaknesses:

Although the media can reach large audiences, they have little control over people's participation. People can turn off their radios and televisions or not buy a newspaper whenever they choose. Presentations can be compromised at times if they have to keep audiences "entertained" to retain their interest. Detailed information must be parceled out slowly and simply so as not to bore audiences.

Implications for Implementation:

The best way to have a conservation message presented through a mass medium is to work closely with an employee of the medium chosen. The educator can provide the material to be presented; the technician can adapt it to the medium's policies, purpose, and audience. Usually, mass media personnel are quite receptive to proposed cooperative arrangements. They consider such arrangements to be a way to obtain free expertise that can help them meet their objectives of educating the public, selling more newspapers, providing public services, attracting advertisers, etc.

Development workers should avoid taking the primary role in publishing or producing their own articles or programs. The communication effort is much more likely to be successful over the long term if counterparts and community members are integrally involved in all aspects of the project from the beginning. As always, the development worker's task should be to facilitate the work of others who ultimately will be responsible for carrying on the project in the future.

Cooperative arrangements can sometimes save the conservation educator the trouble of locating funds and other resources, as occasionally the media will provide them. Often, however, the educator will have to find additional financial support, especially when using television. Support can come from private business sources, or it can come from international aid organizations. For example, an Ecuadoran private conservation group, Fundacion Natura, is the designated sponsor of some environmental programs produced by the British Broadcasting Company, the Cousteau Society, and other organizations. This has allowed them to present their logo and a simple conservation education message during the time set aside in the programs for advertising.

Because of the size of the audience that potentially can be reached through mass media, a great deal of effort must be put into planning how they will be used. One small error can reach thousands of people and be difficult to undo. Unless the message is short and simple, requiring no follow-up information, time is needed to prepare several programs in advance. A long lapse between presentations in a series will lose audience attention and program continuity.

Special Printed Materials: brochures, flyers, coloring books, comic books, story books, "photonovels", etc.

Special printed materials can effectively communicate conservation information in a wide variety of situations. They can be handed out in schools, in extension offices, at oral presentations, to households, in public meeting places, and many other places. Some can even be sold. For people with limited literacy skills, comic books and "photonovels" can be prepared. The publications can vary in length, substance, and quality, depending on the objective.

Audience:

All ages, both literate and, when appropriately designed, illiterate.

When appropriate:

These types of materials are best suited for communicating simple concepts to large numbers of people. They are most effective when supplementing other conservation education efforts, such as extension and school programs, but they should always be able to stand on their own to educate people who are not participating in such programs.

Strengths:

Printed materials can inexpensively communicate information to a large number of people, and they can be referred to repeatedly at the reader's convenience. They can be designed to be appropriate for relatively small target audiences, unlike printed mass media. Some types can be sold to raise money for other conservation efforts.

Weaknesses

As with mass media, special publications depend on the reader's willingness to pick them up and read them. Compared with mass media, the production of special publications costs the educator more money per person communicated with. If the educator produces the publications independently of a mass media apparatus, it will be necessary to find personnel - writers, cartoonists, photographers, layout artists, printers, etc. - materials, printing facilities, and the money to pay for them. This can be very difficult in developing countries.

Implications for Implementation:

Publications can be printed simply on mimeograph equipment, or more expensively with photographs, color reproductions, and typesetting. Developing special publications can require specially trained personnel. A system for distribution of the materials should be developed before undertaking production and thought should be given to showing the materials with groups that might find them useful other than the audience that has been specifically targeted.

Exhibits and Demonstrations

Exhibits can range from a poster on a bulletin board to a large scale display, diorama, or field demonstration of a specific reforestation or soil conservation technique. They can be established in a variety of locations: public squares, schools, town office buildings, health centers, and extension offices, to name a few.

Conservation exhibits can also be established in facilities exclusively dedicated to that purpose. Such places - called nature or outdoor education centers - are widespread in the United States, where they can be found in national parks and wildlife refuges and where they are managed by private conservation organizations, school districts, and all levels of government. These centers can have a wide range of features, including nature trails, demonstration areas, and indoor exhibits. Nature centers are also used for civic meetings, seminars and lectures, cultural events, and teacher training workshops.

Audience:

The general public, all ages. In addition, specially targeted audiences; for example, farmers might be reached with an exhibit in an agricultural extension office or a food market.

When appropriate:

Exhibits can be effective if the audiences targeted by the educational effort are known, or can be convinced to, frequent certain places for a sufficient length of time. They are most effective in presenting short messages and simple practical information.

Strengths

Demonstrations of conservation principles and techniques can be very effective in affecting people's attitudes: people tend to believe something they can see in real life more than in an illustration. If they can see soil conservation techniques being applied effectively in a field, or planted trees growing and yielding useful products, they will probably understand better how such practices can benefit them than if they only hear about them or see them described on a printed page.

Attractive and interesting exhibits can attract audiences to oral presentations, at which time further information can be presented to them. After an initial investment of time and money, exhibits can last indefinitely.

Weaknesses:

For exhibits to be effective, people must come to see them, and the educator has minimal control over who sees the exhibits (traveling exhibits have different drawbacks - see next section). Exhibit materials and the space where they are presented can be costly. Specialists may have to be hired to construct and design complicated displays and dioramas. Maintenance is required, and vandalism is frequently a problem.

Implications for Implementation:

If materials cannot be donated, exhibits can be costly. Outdoor exhibits need some type of shelter and signs to draw public attention; even the simplest exhibits require paper, space, and protection. Permission is often needed for displays in public buildings. Often someone is needed to maintain the display, to make sure the information is kept up to date, and to keep the exhibit clean and attractive. A poorly-maintained exhibit can be counterproductive. (See Judith Brace et al, Peace Corps Manual Teaching Conservation in Developing Countries for excellent and detailed suggestions on exhibit design.)

Traveling Road Shows

These can include exhibits, films, slide shows, puppet shows, and even live animals that travel from place to place, usually in a van or other vehicle.

Audience:

The general public, all ages.

When appropriate:

For delivering simple messages to the general public in remote areas. The information presented can range from practical guidance in conservation techniques to general ecological concepts. As such presentations are usually shown only a few times in one locality at one time, this technique can do little more than raise people's awareness of and interest in environmental subjects.

Strengths

Traveling road shows do what stationary exhibits cannot: they go where the people are, rather than waiting for people to come to them. One van with materials can cover a great deal of territory and offer several education strategies at the same time. Traveling road shows can support long-term conservation education programs already being implemented in rural communities by helping them maintain momentum and reinforcing what is being taught.

Weaknesses:

The appeal of this type of strategy can be deceptive. It is flashy and attracts a great deal of attention, but it is often costly and ineffective as an education tool. As the shows move frequently, they can only treat the subject matter superficially. They require much time, money, and gasoline; and many personnel. Often, substantial numbers of people come to see these presentations, motivated by curiosity and boredom, but little meaningful behavior change can be expected without substantial follow-up. Simply gathering an audience does not guarantee that effective education is taking place. Educators must spend a good amount of time driving from one place to another and maintaining equipment, much of it expensive and susceptible to damage from traveling over bumpy, dusty roads.

Implications for Implementation:

Most successful road shows require their own transportation which leads to additional expense. Sometimes a driver is needed, vehicle maintenance is usually costly, and in many countries fuel is scarce, expensive, and only erratically available. Road shows generally require generators for electrical power, slide projectors, and exhibits; all can be damaged being transported on rural roads.

Special Events

Educational strategies can be presented as part of special events or campaigns, such as annual tree-planting days, wildlife weeks, and anti-litter campaigns. Such events can provide the impetus for further educational efforts that can dramatically increase people's awareness of environmental issues. Special events are very effective for concentrating efforts on a single topic. They can attract speakers, inspire rallies and conferences which attract media attention, and motivate schools and mass media to address selected issues. What is more, the sense of importance and specialness of an event does wonders for enlisting people's participation in the event. Impressive bursts of energy can appear when the time commitment is short, the publicity extensive, the goal clearly worthwhile, and the fellowship and esprit de corps of fellow workers abundant. The net result of special events can be increased effort leading to increased education producing heightened awareness.

One example of a large-scale event is the U.S. National Wildlife Federation's (NWF) annual National Wildlife Week. Each year, a different topic is chosen as the focus of the week; recent topics have included soil, water, the bald eagle, and U.S. public lands. To celebrate the event, NWF produces education kits that include teacher activity guides and posters, and distributes them free of charge to schools across the country. Public affairs announcements for television are also produced, usually with a celebrity as spokesperson. The Federation's magazines and press releases discuss the issue, and media events such as speeches and conferences are held.

When appropriate:

For increasing the general public's awareness of environmental issues; for galvanizing people's participation in implementing educational strategies.

Strengths:

Special events are very effective in rallying volunteer participation and in focusing the public's attention on selected environmental issues.

Weaknesses:

The intensity of special events cannot be sustained for long. After a concerted effort, both program worker and audience may lose interest, energy, and commitment. The program itself loses its sense of urgency. The esprit de corps of volunteer workers may be replaced by a let-down feeling; thus, special events may make it more difficult to enlist volunteer participation in the future. Usually, increasing public awareness only begins to change people's environmental behavior. Unless such events are followed by ongoing educational efforts, people will forget the event's message.

Implications for Implementation:

The success of special events depends a great deal on their scale and the people working on implementing them. Usually volunteer participation is essential: people volunteering to give speeches, write press releases, make posters, contact friends in the government, attend rallies, plant trees, write letters, and staff fund-raising events. Thus, an educator organizing a special event should expect to spend a good deal of time recruiting, organizing, and motivating volunteers.

Events receive significantly more exposure when they become official national events. Government leaders can lend endorsements, the services of their agencies, and perhaps even funds to the programs. With government sanction, organizers can gain access to school systems, enlist agricultural extension to help spread the word, and convince high-level officials to speak at rallies. What is more, official government events are more likely to attract press interest.

Audiovisual Programs

Slide shows, narrated either by a speaker or by a tape-recorded message, can be used to communicate with a wide range of audiences, from schoolchildren to farmers to government leaders. They can effectively keep people's attention and communicate environmental concepts; discussions and additional instruction can follow.

When Appropriate:

When communicating moderately in-depth information. Slide shows are most effective in changing environmental behavior when used as a supplement to more intensive educational efforts, such as extension or school programs. Used alone, a slide show can raise people's awareness of environmental issues.

Audience:

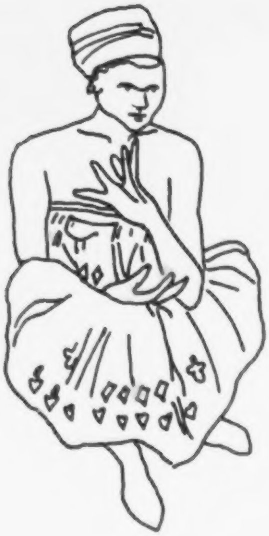
All ages, both general public and specialized audiences.

Strengths:

Proficient speakers can usually communicate the importance of environmental messages and encourage listeners to take action more effectively than printed or other forms of mass media can. In addition, they can provide follow-up advice and answer questions. Slides can obviously help speakers get their point across. Slide shows accompanied by packaged scripts or tape-recorded speeches can enable school teachers and others to effectively communicate environmental information, even though they may not be familiar with the subject matter. Tapes can be prepared in multiple languages. The promise of slides can attract people in rural areas to presentations, and slides can hold their attention.

Weaknesses:

Taking, processing, and presenting slides can require a great deal of time. Slide processing in developing countries is often unreliable and expensive, and equipment and spare parts for projectors can be difficult to locate. Dusty and rough roads can ruin slide projectors and tape recorders, and hot, humid weather can cause mold to grow on slides. Visual communication may be ineffective in certain cultures.



Songs, Proverbs, Parables, Dance

In many developing countries, these and other forms of oral communication predominate over written forms. Indeed, some cultures are not easily able to interpret either words or two-dimensional images. Oral means of communication can have great impact on people's beliefs and behavior, being used to communicate tribal and clan histories, religious dogma, taboos, and traditions as well as current events.

When assessing a community, find out whether such forms of communication prevail. If so, can the conservation message be effectively communicated in such fashion?

Audience:

All ages.

When Appropriate:

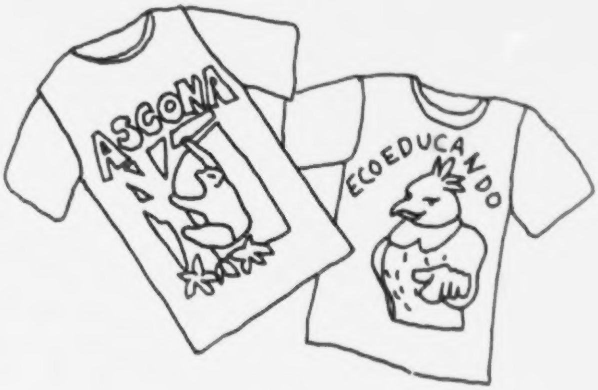
When such forms of communication are considered reliable ways of transferring information.

Strengths:

In certain cultures, such forms of communication are the most effective ways of communicating information. They can often communicate what to western eyes seems to be amazingly complex and detailed information.

Weaknesses:

It can be difficult for a western development worker to adequately appreciate the potential of such means of communication and to effectively work with them. In such cases, counterparts can play critical roles.



Miscellaneous Materials

The conservation educator can also communicate very simple messages using a variety of miscellaneous media, such as bumper stickers, T-shirts, posters, and buttons. Using such materials can effectively increase people's awareness of environmental issues and of the organizations producing the materials. In addition, some of these materials, like T-shirts, can be sold to raise money. Several conservation organizations, including the Association for Conservation of Natural Resources in Costa Rica, the Honduran Ecological Association, and the Paraguayan National Forest Service have successfully sold T-shirts advertising their mission. Meanwhile, on the Caribbean island of St. Lucia, enough bumper stickers have been produced with the illustration of an endangered island parrot to cover half the cars on the island. And, various countries have produced posters illustrating endangered wildlife. Fundacion Natura in Ecuador successfully collaborated with one of Quito's major hotels to produce table placemats for its restaurants illustrating some of Ecuador's endangered plants and animals and providing natural history information.

Audience

The general public.

When Appropriate:

For communicating simple messages to increase people's awareness of environmental issues, events, and organizations. To raise money.

Strengths:

Expressing simple messages through such media can reach people that would otherwise not encounter environmental information. Selling such materials can raise money while communicating.

Weaknesses:

The messages that can be communicated using such materials must be very simple and can only be expected to increase people's awareness. Usually, more intensive education methods will be required to bring about significant change in environmental behavior. Such methods are most effective in reaching the general public, rather than specially targeted groups.

One-to-One Communication

The situation may arise when the conservation educator will have the most environmental impact by educating carefully-selected individuals, rather than groups. Such a strategy is warranted when an individual can significantly influence the behavior of others. Both formal leaders, such as key governmental or political party officials, and informal leaders, such as respected community citizens, can qualify for such attention. Governmental officials can write and enforce laws and policy and organize community development programs such as tree-planting campaigns. Meanwhile, people will often follow the advice and imitate the actions of informal community leaders, because they respect and trust these individuals.

To communicate effectively with such individuals, the educator will have to proceed as with any target audience: present the message so that it addresses the leader's interests and employ a strategy that can effectively get the information across. The educator may try to educate a group of people to which the targeted leader belongs, perhaps using some of the strategies listed in this chapter. Or, it may be most productive simply to speak with the leader informally or socially. The effort may require one meeting or a series of informal contacts spread out over many months. Each leader and environmental situation will be different.

Audience:

Formal and informal community leaders.

When Appropriate:

When one or a few individuals are the key to influencing people's environmental behavior.

Strengths:

Working with just one influential leader to change his behavior can affect the behavior of many other people and generate a genuine commitment that will keep the individual involved over the long term. The approach often requires nothing in equipment. Once a community leader has agreed to use his influence to change people's behavior, he can be a productive ally for the educator in organizing and directing people and in enlisting financial and logistical support. In other words, the leader can become an effective counterpart.

Weaknesses:

In focusing an effort on just one individual, all eggs are put in one basket. If the leader is not convinced or does not come through with promised assistance the educator may have lost valuable time that could have been spent on broader approaches. What is more, the official may move in the hierarchy to a position less useful for environmental concerns.

Implications for Implementation:

For this approach to work, it is critical that the educator accurately identify the influential leaders in a community, their potential effectiveness (i.e., how many people will follow the leaders' direction or example), and how their behavior and opinion can best be influenced. Thus only the educator who understands his community can use this strategy effectively.

SUMMARY

There are many possible education strategies available to the conservation educator, and it is quite likely that more than one strategy will be able to contribute to each program. Selecting strategies requires considering the audiences to be reached, the amount of information to be communicated, and the situation's logistical, financial and other limitations.

Selecting and developing strategies should involve counterparts as much as possible. Strategies should also be evaluated for their potential cost in human resources, time, and finances. Chapter 7 provides guidance in reviewing this type of information.

Review the following questions while selecting a strategy or strategies.

- WHAT WILL BE THE EDUCATION PROGRAM'S TARGETED AUDIENCES? Age, occupation, relationship to environmental problem.......

- HOW DO THE MEMBERS OF THESE AUDIENCES GENERALLY LEARN NEW INFORMATION? Newspapers, T.V., evening school programs, extension materials.....

- IS THE EDUCATIONAL MESSAGE SUPERFICIAL, ESSENTIALLY PROMOTING AWARENESS AND TRANSMITTING LIGHT INFORMATION? Methods for superficial treatment (when used alone):

  Mass media
  Exhibits and posters
  Brochures and booklets
  Traveling road shows
  Special events and campaigns
  Audiovisual programs

- IS THE EDUCATIONAL MESSAGE PRIMARILY PRACTICAL, OFFERING THE AUDIENCE "HOW-TO" INFORMATION TO ENCOURAGE THEM TO TAKE SPECIAL ACTIONS? Methods for practical information:

  - Field trips, demonstration plots
  - Brochures, posters, flyers
  - Newspaper supplements
  - Extension programs

° IS THE EDUCATIONAL MESSAGE TO BE AN INTENSIVE TREATMENT OF THE SUBJECT MATTER, COVERING COMPLICATED CONCEPTS? Methods for intensive information:

- ° School curricula
- ° Training workshops
- ° Extension programs
- ° Seminars, One-on-One Communication
- ° Clubs

° IS THE STRATEGY FEASIBLE GIVEN THE SITUATION'S LIMITATIONS?

- Logistical limitations - e.g., accessibility of target audiences, available transportation, available time you can spend on the project.

- Equipment limitations - What equipment is needed, and how available is it?

- Financial limitations - How much money is available (or potentially available through outside grants)?

- Personnel limitations - How many people are needed to carry out the program's strategies, and what skills do they need to have?

- Policy limitations - What restrictions do the programs have to heed that have been set by the host agency, the agency which is paying extension workers or teacher's salaries, or any other relevant agencies?

° WHAT WILL BE YOUR ROLE IN IMPLEMENTING THE STRATEGIES? See Chapter 7.

7

Implementation

INTRODUCTION

Now the development worker has an education program ready for implementation, one that specifies what will be taught and why, and who will be taught and how. The plan should also include a budget and an estimate of the personnel needed to implement the project. At this point, there will be a host of tasks that will need to be carried out: funding and equipment are needed and personnel must be found and trained, inter-agency agreements signed, and logistics worked out.

As trained available personnel are usually in short supply in developing countries, the development worker may easily end up carrying out critical implementation tasks that fall outside the realm of conservation education. For those who enjoy doing a variety of tasks and working to make plans a reality, this can be the most exciting part of the whole project.

This chapter briefly discusses the roles the development worker might play in implementing conservation education programs.

GUIDELINES

Although program implementation is treated here as a separate phase, it actually begins during program design. If there is one undeniable axiom in development, it is that programs must be designed with the participation of those who ultimately will be implementing them. The best-designed program will lie forever on some dusty shelf unless someone picks it up and does something with it. That person will be far more committed to the project if he or she feels it reflects his or her ideas and concerns. A person can only feel that way from participating in the project's development.

The development worker will still have several roles to play in implementing the conservation education program. Most frequently, this will mean serving as a catalyst, obtaining and organizing host agency interest and participation. Development workers will frequently find that they must do some tasks themselves--for example, approaching a funding agency, arranging meetings between different agencies, or organizing a personnel training workshop. The development worker should carefully consider whether the program will benefit by involving a counterpart in these tasks from the start. It may seem inconvenient and time-consuming, but the development worker's effectiveness will, in the long run, prove more effective because of it.

Quite simply, counterparts should work alongside the development worker, especially if the work will need to continue after the development worker has left. Will funding agencies need to be approached again next year, or will personnel training workshops have to be presented periodically? Somebody will have to know how to do these tasks in the development worker's absence for the program to be effective. The ultimate goal of the conservation educator is to develop a program that continues after she is gone. Few effective conservation education programs end after one or two years (the average stay of a development worker).

In reality, however, there may be nobody immediately available who has the time and training to work side-by-side continually with the development worker. Informal counterparts in the workplace or community then become even more important, as mentioned in Chapter 1.

If an uncomfortable amount of responsibility is loaded on the development worker alone, it is important to be certain that the worker's host agency is fully committed as the project develops. There are several ways to help ensure this.

1. Prepare a chronogram of the work that has to be done to implement the project. This should state what needs to be done - e.g., fund-raising, signing inter-agency agreements, arranging project logistics - and when. Certain deadlines will have to be met; things will have to be accomplished, for example, before the development worker's departure, the year-end budget expires, or the rainy season begins.

The original chronogram, however, will probably be based on only a very rough estimate of the tasks needed to be done and the time that will be required to do them. Most likely, the development worker and counterpart will be trying something new in their community, and they will largely be unable to predict what will happen. In fact, it usually becomes apparent that things take much longer to do than originally surmised. Some tasks, in fact, may be impossible; the money, personnel, equipment, or agency commitment hoped for just are not there. The development worker should not only be prepared to frequently veer away from the chronogram, but be ready to change the entire education program to fit newly-perceived realities. Chronograms might best be updated on a regular basis.

2. As much as possible, in-country resources should be relied upon for financing, personnel, and equipment.

The development worker may easily have access to foreign sources of funding and equipment that the host country agency does not. Such sources can provide crucial contributions to a project; the risk, however, is that the project will develop a dependence on sources which may become inaccessible when the development worker leaves. The project may then expire unless it has developed a continually reliable source of needed resources.

When searching for funding sources, it is important to determine whether outside funding will be needed only once or continually. If funding is needed continually, the development worker should help the project develop secure funding sources within the community. Large foreign donor agencies may be able to provide some money to get a project started; they probably will not be willing to provide funds on a regular basis.

Small but effective methods of local fund-raising should be encouraged: T-shirts, posters, handicrafts, bake-sales, dances, raffles, and contests, for example. In addition, the more the community or the host agency puts into the project the more committed they will be to the project's success.

3. Make sure that the host country agency responsible for implementing the education project periodically performs tasks that contribute to the project's implementation.

If the development worker is carrying out much of the implementation work alone, it is possible to get so absorbed in the work that the commitment of the host country agency to the project is not considered. The agency should be involved not just at the beginning and end of the project, but also periodically throughout. Is the development worker writing a funding proposal? Perhaps a host agency official should sign it, visit the potential funding donor in person, and pledge agency counterpart funds or their equivalent in personnel and equipment. Is the development worker organizing a personnel training workshop? Maybe the host agency director should give an opening day speech and sign and hand out certificates at the workshop's closing ceremony. Is the development worker trying to organize an inter-agency cooperative agreement? A high-level host agency person should attend the meetings and sign the ultimate agreement.

4. Have the project identified as a host country agency, not a Peace Corps or outside development agency, project.

Throughout the program's design and implementation, the development worker should have made clear to the host agency how the program contributes to the agency's interests. Now, even if the development worker has been chiefly responsible for the program's development, he should take only minimal credit for the work done. Written materials, for example, should name the host agency not the development agency as the main publisher of the materials. Local press and television coverage of the project should be encouraged, identifying the host country agency as the project's sponsor. This can significantly increase host agency commitment to making the project a success.

SUMMARY

Chances are conservation educators working in a developing situation will themselves play important roles in starting and implementing the projects they have helped design. The challenge confronting them is not only carrying out these responsibilities successfully, many of which may be totally unfamiliar, but also in making sure that host country agency commitment to the project and its ability to carry it out are not lost.

The chapter discusses several techniques to help ensure community and host agency involvement:

- Preparing a chronogram listing the project activities that need to be carried out and, from it, determining what the development worker must do and what host agency personnel and community members should do.
- Developing sources of funding, equipment, and personnel that the project can tap into after the development worker's departure.
- Working with a counterpart whenever possible, particularly on tasks that must be carried out after the development worker leaves.
- Making sure the host country agency responsible for carrying out the project participates periodically in its implementation.
- Making sure the host country agency and community members receive appropriate credit for the project.

Questions

- WHAT ARE THE TASKS THAT NEED DOING TO GET THE PROGRAM STARTED?
- WHEN DO THEY ABSOLUTELY HAVE TO GET DONE? WHEN WOULD IT BE PREFERABLE TO HAVE THEM DONE?
- WHICH TASKS SHOULD AND CAN BE DONE BY HOST COUNTRY PERSONNEL; WHICH ONES HAVE TO BE DONE BY YOU; BY COMMUNITY MEMBERS?

- HOW CAN THE HOST COUNTRY AGENCY PARTICIPATE IN EACH TASK TO KEEP ALIVE ITS INTEREST IN THE PROJECT AND DEMONSTRATE ITS COMMITMENT?

- WILL THE PROJECT NEED CONTINUAL SOURCES OF FUNDING, EQUIPMENT, AND OTHER RESOURCES? IF SO, HAVE YOU TAPPED SUCH SOURCES? DO HOST COUNTRY PERSONNEL AND/OR COMMUNITY MEMBERS HAVE THE ABILITY TO SUCCESSFULLY APPROACH SUCH SOURCES?

- DOES THE HOST AGENCY FEEL THE PROJECT TO BE ITS OWN?

8

Evaluation

INTRODUCTION

Evaluation should be carried out while the education program is in progress as well as after the effort has ended. Carrying out periodic evaluations while the program is in progress can enable the development worker to make mid-course changes and improve the program's effectiveness. Evaluating at the end of the effort can benefit others who follow. This includes not only people in the worker's site, but people working on similar projects in other communities as well. There is a notable scarcity of documented conservation education case studies, so objective and detailed accounts of program successes and difficulties can significantly help others. (Peace Corps' Information Collection Exchange office was specifically established to help in this exchange of information.) Program-end evaluation can also prove valuable to the development worker's host agency. With data from the evaluation, the agency can decide how to implement such programs in the future and, in fact, whether the time and expense invested in the program could best be spent elsewhere.

The conservation educator can accomplish a great deal through continuous scrutiny of his own efforts on the project, but can also benefit from the perspectives of others. Understandably, people are often reluctant to have their "performance" evaluated. Obviously, a development worker who has worked hard to accomplish something does not care to have an outsider come in and criticize the effort and perhaps even the worker himself. Properly done, however, a program evaluation is not a personal critique. It is a tool to aid the worker and others to better accomplish their goals.

Progress in program design and procedure are impossible unless people can learn from the efforts of those who have preceded them. Realistically speaking, it may take the educator two years just to establish a program, and there may be no opportunity to evaluate it. Nevertheless, because evaluations are so worthwhile, every effort should be made to do them.

GUIDELINES

The ultimate test of a conservation education effort is whether it has led to improved environmental management. A conservation education program cannot be considered successful unless it is reflected in people's behavior and unless that behavior change favorably affects environmental problems. Sometimes, many years may pass before a program's effect can be appraised, but the program's progress toward its goals can still be evaluated while it is being implemented.

Unfortunately, many people attempt to evaluate programs by simply evaluating the materials produced by the program. A set of wildlife posters, for example, can be attractive and accurate and may be displayed throughout a country. They do not, however, represent a successful conservation education effort if wildlife are not being managed any better because of them. Perhaps the people indiscriminately killing wildlife do not live in communities where the posters are displayed. Or, the reason that wildlife is being killed may not be because people do not appreciate it, but because they have been offered no alternative. In these cases, the posters would not have reached the right target audiences, or they would not have addressed the reasons for the wildlife mistreatment. They would be attractive, but irrevelant.

Consider, also, the case of one conservation organization that wanted to help customs agents recognize endangered orchids being transported into the country. To do this, the organization sponsored a set of watercolor paintings of the orchids, which everyone agreed were well-executed and attractive. There was only one problem: most orchids are transported as rootstocks, not blossoms, so the paintings looked like nothing the custom agents would encounter. Thus the educational effort failed to effectively address the problem, in spite of the quality of the materials produced.

The first step in effective evaluation is the clear identification of the program's intended objectives. Obviously, it is impossible to determine how successfully a program has achieved its goals unless the goals are clearly stated. Here, the program's Intended Learning Outcomes (ILO's), as described in Chapter 5, become critical. As they clearly outline what the program was to accomplish, it is easy to run down the list to check a program's progress.

Next, it is important to see if people have actually acquired the knowledge, attitudes, and skills - the program's ILO's - that have been transmitted. Have farmers learned how contour plowing controls erosion, how to operate insecticide application equipment correctly, and why planting trees on the hillside is a good idea? Do coastal dwellers understand the value of the mangrove swamp and why they should not harvest sea turtle eggs recklessly? If the people seem to have failed to grasp this information and put it into practice, it could be because: 1) they have not been exposed to the message - e.g., they do not listen to a radio or read the newspapers where the message has been communicated; 2) they have not understood the message - e.g. the message was written and they cannot read, or it was taught in a complicated manner, or 3) they do not believe the message because it is either inconsistent with their established beliefs and customs or they do not trust the educator or the agency he represents.

Even if people seem to have learned and believed the program's message they may still have not changed their behavior for several reasons. Perhaps the attitudes the program has been trying to change were not the reasons for people's behavior in the first place. The educator may have been trying to teach people how to appreciate a mangrove swamp and may even have been successful. People may still, however, be clearing the swamp because they absolutely require the firewood. In this case a lack of appreciation was not the reason the swamp was being cleared. A different message would be needed to change behavior.

It is also possible that some people's attitudes may have changed because of the educational effort, but these people were not the ones affecting the resource. In this case, the target audience has been misidentified. A wildlife educational program presented in the capital city's newspaper may be ineffective if the people hunting wildlife are nomads in the country's interior. A nature trail in a park may do little to improve how the park is treated if the people walking the trails are foreign tourists, while the people cutting down the park's trees are local residents.

Quite possibly, also, people have not changed their behavior as much as expected, but there is nothing in the program that needs adjustment. Changing people's attitudes and behavior does not happen overnight, and time may be all that is needed. People, typically, are hesitant about trying something new. A small farmer, for example, does not usually enjoy a large margin for error. Plowing his field differently or planting trees on his land may be profitable or it may not. At least he knows what to expect with his current methods; changing his methods could, for all he knows, make matters worse. He may think that what he is told makes sense, but the risks of changing are too great.

The continuum in Chapter 5, p. 55, illustrating the level of awareness and motivation of target audiences can assist in evaluating a program's progress. If people are not even aware a problem exists, it would be unrealistic to expect a program to have immediate results changing people's behavior. Moving people through the stages in this continuum is the role of a conservation education program, and how effectively it is doing this is a measurement of its success.

Almost assuredly, it will not be possible at the begining of a program to predict how long it will take to affect people's behavior or how many people will need to change their behavior for the program to be considered a success. If the measures for people to adopt are totally new to them, no one may actually be implementing them after a two-year effort. That does not necessarily mean that the program needs revision or that it is not worthwhile. Only one person plowing on the contour after the education program may constitute a reasonable success.

What is often necessary is for someone in the community to take the lead, preferably someone who is widely respected. Farmers in this case can then see first-hand the consequences of changing their practices, which is usually more convincing than hearing about the consequences or seeing them illustrated in a pamphlet. Getting that first person to try something new may be the hardest part of the educational effort; after that, others may follow suit on their own.

Getting accurate data that reflects people's knowledge and attitudes before and after the program will be a challenge. It is easiest to determine whether people have learned the material, and most difficult to determine why they are behaving as they are. Formal questionnaires and controlled interviews can provide accurate information, but may be impossible given the working relationship developed between educator and program participant. People may be taken aback when a relaxed and friendly educator suddenly confronts them with paper, pencil, and formal questions. Informal data gathering, on the other hand, will produce less precise data, but will probably be more feasible.

It always helps to bring up the need for an evaluation at the earliest stages of program development. During a teaching session, for instance, simply ask the people questions to see if they have learned and understood what has been taught. Or, if teaching manual skills, ask that participants demonstrate them. Listening and asking questions as part of normal conversation can also reveal much that people are thinking. Keep in mind, however, that people often say what they think evaluators want to hear. They may be friends, they may know what the educator thinks, and they will not want to disagree.

Explaining behavior, on the other hand, is less cut-and-dry than determining what people know, and the educator may have to rely largely on intuition. It can always be expected that people are unsure about adopting new ways of doing things, even if such measures appear to the outsider entirely reasonable. If people are unsure (or, if they are refusing to change their behavior for other reasons, such as social pressure or lack of trust in the educator), they frequently will not tell the educator directly. They may simply shrug or evade the question when asked to explain. Here, the educator may find it useful to consult counterparts.

SUMMARY

Evaluation is a vital, yet frequently neglected, part of effective conservation education programs. Ongoing program evaluation is extremely useful when trying to increase an educational program's effectiveness. For those who like to be creative in solving problems, it can also be enjoyable. Program-end evaluation will probably be required by host-country or sponsoring agencies so that they can determine where best to allocate time and effort. In addition, such evaluation can prove critically important to others trying to accomplish similar goals.

Questions

If people are not using the measures advocated by the education program:

- HAVE THEY LEARNED AND DO THEY UNDERSTAND AND BELIEVE THE PROGRAM'S MESSAGE? IF NOT, IS IT BECAUSE THEY:

  - Have not encountered the message? Review the educational methods to see if they have reached the intended audiences. Who came to the teaching sessions; who listened to the radio programs, read the series of newspaper articles, or saw the posters delivering the message? Required: An adjustment in education method.

  - Have not understood the message? Ask the people to answer questions that indicate their understanding of the material. Required: An adjustment in how the content is presented.

  - Do not believe it because it is inconsistent with their beliefs and traditions? Ask counterparts, close friends, or the people being educated if relevant customs and beliefs have been neglected. Required: 1) Adjustment in how the program's content is presented, or 2) adjustment in the program's technical solution, or 3) additional time for people to become accustomed to message.

  - Do not trust the educator or the agency he represents? Ask counterparts or close friends. Required: Time or a change in strategy.

- IF THEY HAVE GRASPED THE PROGRAM'S MATERIAL, ARE THEY NOT CHANGING THEIR BEHAVIOR BECAUSE:

  - There is a lack of concern about the environmental problem? Required: Increased attention paid to developing concern.

  - Social pressure exists? Do influential people distrust or not believe the educational program's message? Required: Inclusion of group applying social pressure as a target audience of the educational program.

- The actions advocated by the education program are unrealistic or economically unsound? Ask the people you have been trying to educate if they have doubts about the effectiveness of the measures advocated by the education program. Required: An adjustment of the technical solution.

- People are nervous about the consequences of changing behavior? Have you been able to discount other possible reasons for the lack of implementing the education program's measures but still sense a general reluctance? Required: 1) time, or 2) concentration of educational efforts on community leaders, or 3) change in education methods, perhaps including demonstrations or field trips to sites where actions being advocated by the educational effort are being used successfully, or 4) financial or other incentives to encourage people to take chances on changing their behavior (i.e. payment for planting trees or tax incentives for leaving land fallow or implementing soil conservation techniques.

- IF PEOPLE ARE IMPLEMENTING THE MEASURES ADVOCATED BY THE EDUCATION PROGRAM, BUT THE CONDITION OF THE ENVIRONMENT HAS NOT IMPROVED, IS IT BECAUSE:

  - The technical solution advocated by the program is inappropriate? What do outside experts say? Required: An adjustment in the program's technical solution.

  - The people whose behavior has changed are not those affecting the natural resources in question? Whom has the education program reached? Are they the people affecting the environment? Required: An adjustment in the program's target audience.

  - More time is needed to evaluate the situation. The effects of changing certain environmental practices often appear gradually.

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